CAR TALK STUFF

THE CAR/LIGHT TRUCK OF 2003

A new car or light truck in the year 2003 will be safer and more environmentally-friendly than current models. Alternative-fuel vehicles also will become more widely available. However, these new features will not be cost-free. The following describes how these changes will affect vehicles, relative to 1993 models.

Safety

The implementation of three major regulatory requirements definitely will change cars over the next 10 years. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 requires all new passenger cars to be equipped with driver- and passenger-side airbags by model year (MY) 1998. For MY 1993, about 66 percent of new cars have driver-side airbags and about 12 percent have passenger-side airbags. All cars will have improved "dynamic" side-impact protection, as National Highway Traffic Safety Administration (NHTSA) requirements for assessing side impact performance in a crash test (as opposed to "statically" crushing a door in a laboratory) phase-in during the mid-to-late 1990s. In response to new NHTSA requirements, they also will have more energy-absorbing material on interior surfaces, to reduce the risk of head injury in crashes. These three requirements are expected to add $251 (1992 economics) to the price of the average new car, relative to model year 1993 levels. NHTSA estimates that the average 1993 car already includes $721 in mandated safety equipment.

Even more changes are expected in light trucks. Light trucks will need to comply with roof crush, center-high-mounted-stoplamp, and "static" side impact requirements that already apply to passenger cars. They also will have to add driver and right-front passenger airbags and energy-absorbing material on interior surfaces. These requirements are expected to add about $540 (1992 economics) to the price of the average light truck.

With the average new car selling for about $18,000 in 1992, the $251-540 consumer cost increases discussed above will add about 1.4 to 3.0 percent to the average new car price. With a typical price elasticity estimate for cars of -1.0, such increases could result in comparable percentage decreases in new vehicle sales. However, currently consumers are demanding more safety features in their cars and light trucks. Thus, they are likely to perceive these changes as being quality increases, resulting in these requirements having a negligible effect on light vehicle sales. These requirements will affect domestic and foreign producers equally; thus they will not put U.S. auto companies at a competitive disadvantage.

Although these safety regulations will be cost-effective and result in substantial benefits to society (including lives saved, injuries prevented and reduced in severity, and health care costs), they will impose additional consumer costs beyond the aforementioned price increases.

Safety equipment will add weight to vehicles, resulting in some fuel economy loss. The safety requirements discussed above are expected to add about 43 pounds to the weight of the average 1993 car and about 74 pounds to the weight of the average 1993 light truck over the next 10 years. These weight increases will result in average fuel economy penalties of 0.3 mpg for both cars and light trucks.[1] Assuming a continuation of the current (about $1.15 per gallon) real level of gasoline prices, these fuel economy penalties translate into additional consumer costs of $42 for passenger cars and $86 for light trucks over their operating lives (present value, using a 7 percent real annual interest rate and mid-year discounting).

There also are a number of additional safety regulatory requirements that could be implemented in the next decade. Even with an "all-airbag" fleet, NHTSA expects there to still be about 10,000 passenger car occupant fatalities annually in frontal collisions. NHTSA is performing research on advanced frontal crashworthiness concepts, emphasizing offset frontal crash tests at this time. The expected goal is reduce vehicle "intrusion" into the passenger compartment during severe frontal crashes. This may lead to regulatory requirements for which auto manufacturers must make their cars' front-ends more energy-absorbent, while improving the structural integrity of the passenger compartment to reduce intrusion in severe crashes. NHTSA also is considering applying the "dynamic" side impact protection standard to light trucks. Furthermore, NHTSA is considering upgrading its fuel systems protection standards; this would result in fuel system components being strengthened and protected to further reduce the risk of fire. At this point, NHTSA has no estimate of the possible costs of these requirements.

With increasing consumer interest in safety features, NHTSA expects auto manufacturers to voluntarily install many safety features. Some vehicles probably will be equipped with side-impact airbags, located in their doors or interior side panels. Safety belts will include "pretensioners" to tighten them in crash modes, and some vehicles will be equipped with inflatable safety belts for additional protection. Many vehicles will have safety belts integrated into the seat itself (instead of being attached to the car body) to enhance comfort and safety. Light trucks, utility vehicles, and small cars will be designed to be more rollover-resistant, in response to either market pressures or potential Federal regulations. Built-in child restraints will be standard in many cars and available on almost all models. Market forces (or government mandate) will make anti-lock brakes standard on all cars and light trucks. Most, if not all, cars and light trucks also will be equipped with traction control to limit wheelspin on slippery surfaces. Some vehicles will be equipped with crash-avoidance and convenience technologies such as proximity sensors and "smart" cruise control to warn drivers if they are

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[1]Based on average model year 1992 (1993 data are not yet available) test weights and fuel economy values of 3,307 pounds and 27.9 mpg for cars and 4,169 pounds and 20.7 mpg for light trucks.

about to back into something or if it is unsafe to change lanes or if they are following too closely.

NHTSA will also be implementing other vehicle regulatory requirements, which are not safety-related, over the next few years. For example, under the Anti-Car-Theft Act of 1992, NHTSA is required to extend parts-marking requirements to many light trucks, as well as "low theft" passenger cars. This requirement will cost about $2 per average car or light truck, over and above current levels. Under the 1992 American Automobile Labeling Act, NHTSA must issue requirements for auto manufacturers to provide labels on cars and light trucks indicating the domestic content of their parts, effective in model year 1995. No estimate has been made as to the cost of this requirement. NHTSA must also issue fuel economy standards for light trucks for 1996 and subsequent model years. NHTSA also can amend the current (27.5 mpg) passenger car fuel economy standard. No estimates are available on the possible costs of these standards.

The sum of these requirements is placing a heavy burden on auto industry engineering resources. In response more to consumer demand than to regulatory requirements, in the next few years manufacturers will rapidly phase-in full frontal airbags into passenger cars and light trucks. This typically requires dashboard redesign, perhaps some changes in the frontal structure of each vehicle, and crash tests. The industry's major concern, however, with regard to NHTSA safety requirements, is the proposed rule that would effectively require windshield pillars, roof rails, and other upper interior components to have enhanced energy-absorbing capabilities. The industry has argued strongly for a long leadtime and an extended phase-in so that these capabilities can be design into new vehicles, rather than substantially modifying existing designs. In general, in recent years NHTSA has used phase-ins, and occasionally relatively-long leadtimes, in establishing effective dates for new regulatory requirements so that manufacturers can minimize compliance costs by designing safety equipment into new vehicles, rather than substantially modifying existing designs.

Additional material providing more detailed information on upcoming NHTSA regulatory requirements is attached.

Alternative-Fuel Vehicle Demand from EPACT Fleet Requirements

The 1992 Energy Policy Act (EPACT) contains alternative-fuel vehicle (AFV) purchase requirements for "covered" Federal, fuel provider, and State fleets. The Act also requires the Department of Energy to determine if AFV purchase requirements should be implemented for private and municipal fleets. To implement private fleet purchase requirements, the Department must carry out one or two rulemakings to determine if private fleet requirements are necessary to meet the motor fuel displacement goals of the Act (10% in 2000 and 30% in

2010). The Department must demonstrate that such requirements are both economically and technologically feasible.

Alternative fuels (methanol, ethanol, compressed natural gas (CNG), and propane (Liquid Petroleum Gas)) can be distinguished from conventional fuels by the fact that their properties are sufficiently different to require minor-to-complete changes in engines, fuel storage systems, refueling and fuel distribution systems, production technologies, and resource bases. Fuel properties have crucial implications for cost and performance.

All of the alternative fuels have lower energy densities, whether per pound or per gallon, relative to gasoline or diesel fuel. This means that either more fuel must be carried on board to achieve the same range, or the vehicle must be refueled more frequently. All of the alternative fuels for spark-ignition engines have higher octane numbers than gasoline and thus, offer the potential to increase compression ratios, increasing the engine's thermodynamic efficiency.

Conventional engines can be operated on methanol, ethanol, CNG, or LPG, with relatively minor modifications. Methanol flexible-fuel vehicles (FFVs) can operate on any mixture of gasoline and M85 (85 percent methanol and 15 percent gasoline). FFVs and dual-fuel CNG vehicles offer an attractive means of making a transition to alternative fuels. The ability to use a conventional fuel reduces the risk to an operator of an alternative-fuel vehicle and decreases the potential problem of fuel availability in the early stages of an alternative-fuel market.

Current costs of CNG conversions range from $2,000 to $3,500, depending on vehicle type. Preliminary estimates of incremental OEM costs for large-scale production are much lower, on the order of $800 per vehicle. FFVs require special features that will increase their cost by about $300 over comparable conventional-fuel vehicles. This incremental cost estimate assumes large-scale production.

In 2003, it is projected the AFV demand will vary from 177,000 to 541,000 units (between 1.2 and 3.8 percent of total light-duty sales). The lower-bound number is under a scenario where private fleet requirements are not implemented, while the higher number occurs if the Department implements private fleet requirements under the first rulemaking. By 2010 (i.e., full implementation), AFV purchases will be between 195,000 and 886,000 units (between 1.2 and 5.3 percent of total sales). The lower number is under a scenario where the private fleet program is not implemented. The upper-bound number represents sales if a private fleet program is implemented, regardless if it under the first or second Department rulemaking.

Alternative-Fuel Vehicle Demand from EPACT Fleet Requirements				
Scenario	2003		2010	
	Light-duty AFV Purchases	AFV Purchases as (%) of Total LDV Sales	Light-duty AFV Purchases	AFV Purchases as (%) of Total LDV Sales
No Private Fleet Program	177,000	1.2%	195,000	1.2%
Private Fleet Program under 1st DOE Rulemaking	541,000	3.8%	886,000	5.3%
Private Fleet Program under 2nd DOE Rulemaking	444,000	3.1%	886,000	5.3%

Effect of other EPACT provisions on Alternative-Fuel Vehicle Demand

It is unclear what effect the EPACT alternative-fuel tax incentives, research, development and demonstration (RD&D) programs and other supporting programs will have on AFV demand. Tax incentives in the form of AFV tax deductions/credits and tax deductions for alternative-fuel refueling facilities should provide a significant economic stimulus to AFV demand from 1993 through 2003. These tax incentives are, however, gradually phased out beginning in 2002, with total purchase-out by 2005. Significant RD&D programs in the areas of alternative-fuel technologies, as well as electric vehicle systems and infrastructure, could induce technological breakthroughs that could greatly expand the market for AFVs. Additionally, supporting EPACT programs in the areas of State and local alternative-fuel incentives. low-interest, loans, public information and training certification could also expand the market for AFVs beyond the projections based on fleet purchase requirements alone.

EPA

ENVIRONMENTAL REGULATIONS

Exhaust Emission Standards

Tier 1 Tailpipe Emission Standards -- The 1990 Clean Air Act Amendments contain more stringent tailpipe hydrocarbon (HC) and nitrogen oxide (NOx) standards for passenger cars and light trucks. The standards have been promulgated and will be phased in starting with the 1994 model year through the 1996 model year. Modifications to the vehicle to meet these standards will involve primarily changes in catalyst location, shape, size, and internal contents and changes in fuel metering and fuel control calibrations. EPA's regulatory impact analysis estimates the cost of meeting the tier 1 standards to be approximately $152 per vehicle. No effects on driveability or performance are expected as a result of these changes. EPA projects annual HC emissions reductions of 160,000 tons in year 2005 and annual NOx emissions reductions of 850,000 tons in year 2010.

Cold Temperature Carbon Monoxide (CO) Standards -- In the 1990 Clean Air Act Amendments, CO standards were established for cold temperature for passenger cars and light trucks; previously CO standards for vehicles were measured only for the warmer temperature range of the Federal Test Procedure. The standards will be phased in starting with the 1994 model year through the 1996 model year. Modifications to the vehicle to meet these standards will be limited to calibrations of fuel controls for the majority of vehicles. Recalibration of vehicles is expected to cost about $15 to $20 per vehicle. Offsetting this cost will be expected fuel economy benefits of about $27 to $32 per vehicle, for a net cost savings of about $12 per vehicle. No driveability or performance effects are expected as a result of these standards. The regulatory impact analysis for this regulation projects annual CO emissions reductions of 5.8 to 7.7 million tons after full fleet turnover to the new standards (about year 2015).

Tier 2 Tailpipe Emissions Standards -- The 1990 Clean Air Act Amendments require EPA to complete a study by June 1997 on the need for and feasibility of more stringent tailpipe emissions standards; such standards could be phased in between the 2004 and 2006 model years. Although specific tier 2 standards would have to be set via regulation, the Act contains reference standards that are similar to the first phase of the more stringent emissions standards which are being phased in California starting in the 1994 model year. During the tier 2 study, EPA will be investigating the kinds of technologies which manufacturers will need to use to meet these standards, the costs of these changes, the environmental impact of these standards, and other impacts such as potential effects on driveability, performance, and fuel economy.

California Low Emission Vehicle Program -- Starting in the 1994 model year, more stringent standards, collectively referred to as the Low Emission Vehicle (LEV) program, will be phased in for vehicles sold in California. Manufacturers are expected to use multiple catalysts or electrically heated catalysts and possibly other technologies to meet the most stringent of these new standards. Among other requirements, the LEV program requires that a percentage of vehicles, starting in the 1998 model year, be "zero emission vehicles;" at this time it is expected that this requirement will be met by the sale of electric vehicles. The driveability and performance effects of these changes will depend on the technologies used to meet the standards. There is a wide range of cost projection to meet these standards from as little as about $60 per vehicle (California Air Resources Board) to several hundred dollars per vehicle. The Clean Air Act allows other states with nonattainment problems to opt for the California vehicle standards. To date, New York, Massachusetts, and Maine have adopted California's LEV standards. Additionally, most other Northeast and Middle Atlantic states are considering adopting them.

On-Board Diagnostics (OBD) Systems

The 1990 Clean Air Act Amendments require auto manufacturers to design computers on-board vehicles to monitor emissions performance, notify drivers of malfunctions, and store data to assist technicians in repair of faulty systems. These OBD systems will be phased in during the 1994 through the 1996 model years. Changes to vehicles to meet these regulations will include the addition of sensors to monitor catalyst malfunctions, misfires, and evaporative system malfunctions as well as an increase in computer software and memory capacity. These changes will add less than two pounds to the weight of a vehicle, and they will have no driveability or performance effects. EPA's regulatory impact analysis for this regulation estimates an average cost of $65 per vehicle as a result of this regulation. The environmental benefits of this rule after full fleet turnover (about year 2020) are estimated to be annual reductions of 1.0 million tons for hydrocarbons, 7.6 million tons for carbon monoxide, and 0.6 million tons for nitrogen oxides.

Evaporative Emissions Requirements

The 1990 Clean Air Act Amendments require auto manufacturers to improve the capabilities of evaporative emissions control systems on future vehicles. These improved systems will be phased in during the 1996 through the 1999 model years. Changes to the vehicle will include the use of larger canisters to

collect vapors, improved materials to eliminate permeation of fuel through fuel lines, and changes to computer controls to regulate vapor purging from the canister to the engine. These changes will have no driveability or performance effects. EPA's regulatory impact analysis estimates the increased cost due to this regulation to be about $10 per vehicle; however, this cost is largely offset by an estimated $9 per vehicle for fuel savings over the life of the vehicle. EPA estimates that after full fleet turnover the annual emissions reduction benefit of this regulation will be from 700,000 to 1 million tons of hydrocarbons.

Onboard Refueling Vapor Recovery

The 1990 Clean Air Act Amendments require EPA to promulgate requirements for systems onboard vehicles to control refueling vapors. This regulation is scheduled to be completed in January 1994 and will probably be phased in during the 1998 through 2000 model years. Vehicle changes necessary to meet the requirements will depend to some degree on the manufacturer's design but will most likely include a slightly larger vapor collection canister, modified rollover valve in the gasoline tank, addition of a fillneck seal, and a larger vapor line to the canister. These changes will have no impact on driveability or performance. The costs are projected to be about $10 per vehicle, and this cost will be offset partially by fuel savings of about $5 per vehicle over the life of the vehicle. When the new technologies are fully phased into the fleet (about year 2015), emission reduction benefits are projected to be about 950,000 tons per year of hydrocarbons.

Chlorofluorocarbon (CFC) Phaseout

As a result of international agreements and requirements of the 1990 Clean Air Act Amendments, the U.S. has agreed to halt production of CFCs by January 1, 1996, including CFC-12 which has traditionally been used as the refrigerant in auto air conditioners. Starting with the 1994 model year, practically all new auto a/c systems will be using a substitute refrigerant. The new refrigerant operates at a slightly higher pressure and requires a different lubricant, but the new system is almost identical to existing systems. There will no additional costs associated with using the new systems, and they will have no effects on driveability or performance of the vehicle.

Automotive Manufacturing Facilities

As a result of requirements of the 1990 Clean Air Act Amendments, motor vehicle manufacturers will be required to meet new requirements to limit emissions at automotive manufacturing facilities. EPA is required to develop guidelines for reducing emissions from the coating of plastic automotive parts; a draft document is expected by the fall of 1993 and a final document by the end of 1994. EPA is also drafting a technical report regarding actions to reduce the use of cleaning solvents, which could affect a variety of industries including the auto industry; once the report is completed, states will determine the type and degree of cleaning solvents regulations to employ on a case-by-case basis. Under the air toxics program, the auto manufacturing industry may be required to further control emissions from the use of solvents from painting applications (spray booth and bake oven exhausts); this regulation is scheduled to be completed by the end of 1997. The economic and environmental impacts of these regulations will be evaluated as these projects proceed.

ATTACHMENT

DOT, NHTSA

MAJOR NHTSA REGULATORY REQUIREMENTS FACED BY THE AUTO INDUSTRY
(percent of fleet affected)

	Model Years								
	1993	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
1. Car side impact protection		10%	25%	40%	100%==========>				
2. Lt. truck auto. restraints			20%	50%	90%	100%==========>			
3. Mandatory air bags (cars)					95%	100%==========>			
(lt. trucks)						80%	100%==========>		
4. Mandate Hybrid III						100%(est.)==========>			
5. Lt. truck side impact protection		90%	100%==========>						
6. Lt. truck roof strength			100%==========>						
7. Lt. truck CHMSLs		100%==========>							
8. Rollover protection				[TBD]					
9. Interior head impact protection				[TBD]					
10. Car anti-lock brakes				[TBD]					
11. Upgrade fuel system std.				[TBD]					
12. Domestic content labeling			100%==========>						
13. Theft labels (cars)	50%==========75% (est.)========100% (est.)==========>								
(lt. trucks)				75% (est.)========100% (est.)==========>					
14. Car CAFE	27.5 mpg==========>								
15. Lt. trk. CAFE	20.4	20.5	20.6 mpg	[TBD]					

DESCRIPTION OF REQUIREMENTS

1. **Car side impact protection:** Test dummies are placed in front and rear seats, and car is hit in the side with a deformable barrier (simulating a vehicle) at 33.5 mph. Maximum "injury" readings on dummies must not be exceeded. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 requires DOT to consider comparable requirements for light trucks.

2. **Light truck automatic restraints:** NHTSA regulations require light truck manufacturers to phase-in the use of automatic restraints ("passive" belts or air bags) beginning in model year 1995. All cars have been required to have automatic restraints since model year 1990. Essentially all light trucks are expected to be equipped with air bags to satisfy this requirement. In the long run, this NHTSA requirement is superseded by the ISTEA requirement (see #3 below) that all cars and light trucks be equipped with driver and right-front passenger air bags.

3. **Mandatory air bags:** ISTEA requires all new cars and light trucks to be equipped with driver and right-front passenger air bags by model year 1999.

4. **Mandate Hybrid III:** Manufacturers currently have a choice of using either of two test dummies to certify the 30 mph, frontal crashworthiness of their cars. NHTSA has proposed that manufacturers only be allowed to use the "Hybrid III" dummy, which is more "humanlike" than the alternative, "Hybrid II" dummy. NHTSA proposed a model year 1997 effective date. NHTSA also has proposed the sole use of Hybrid III in the New Car Assessment Program, which tests the frontal crashworthiness of cars and light trucks, with restrained occupants, at 35 mph. NHTSA proposed a model year 1994 effective date for this change. NHTSA has not issued a final rule on either proposal.

5. **Light truck side impact protection:** NHTSA regulations require light trucks to begin meeting a "quasi-static" side impact protection requirement that cars have been required to meet since 1973. This requirement covers only side door strength and is not as stringent as the "dynamic" requirement discussed in #1 above.

6. **Light truck roof strength:** NHTSA has extended, with minor changes, to light trucks a roof strength standard that has applied to passenger cars since model year 1974. The effective date for light trucks was recently deferred from model year 1994 to model year 1995 because of concerns about the effects on small business (primarily aftermarket van converters).

7. **Light truck Center High-Mounted Stoplamps (CHMSLs):** Requires centrally-mounted third brakelamp. Applies to light trucks beginning in model year 1994. Has applied to passenger cars since model year 1986.

8. **Rollover protection:** ISTEA requires DOT to consider requiring protection against rollover for occupants of passenger cars and light trucks. This will be addressed through several rulemakings (including #9 below). NHTSA published an ANPRM in January 1992 and a rollover plan in September 1992. Proposals are still under development; effective dates are to be determined.

9. **Interior head impact protection:** NHTSA has issued a proposed rule, which would effectively require padding on windshield pillars, roof rails, and other upper interior components, for passenger cars and light trucks, to reduce the risk of head injuries from hitting these components in crashes. NHTSA has not decided whether it will phase-in this requirement, or whether all vehicles will be required to comply simultaneously. The proposed rule suggested an effective date two complete model years after the issuance of a final rule. If NHTSA does not change this part of the proposal, the effective date(s) would begin with model year 1997.

10. **Car anti-lock brakes:** ISTEA requires NHTSA to issue an ANPRM by December 31, 1993 to consider the need to require anti-lock brakes on passenger cars. NHTSA may also consider anti-lock brakes for light trucks. NHTSA is not required by ISTEA to issue a final rule mandating anti-lock brakes.

11. **Upgrade fuel system standard:** In December 1992, NHTSA published a Request for Comment in the *Federal Register* indicating that the agency is considering upgrading its current fuel systems protection standard for passenger cars and light trucks. Any upgraded requirements and effective date(s) are to be determined.

12. **Domestic content labeling:** Under the American Automobile Labeling Act (passed in 1992), NHTSA must issue requirements for manufacturers to label the domestic content of the equipment used in their cars and light trucks, effective in model year 1995. NHTSA plans to issue a proposed rule this summer.

13. **Theft labels:** Under the Anti-Car-Theft Act of 1992, NHTSA is required to extend parts-marking requirements to many light trucks, as well as "low-theft" passenger cars. "High theft" passenger cars already are required to be marked (or to be equipped with alarm/"starter interrupt" systems). NHTSA is undertaking rulemaking to implement these requirements.

14. **Car Corporate Average Fuel Economy (CAFE) standard:** The current standard is 27.5 mpg. This can be amended by NHTSA through rulemaking.

15. **Light truck CAFE standard:** The Clinton Administration has recently established a standard of 20.6 mpg for model year 1995 light trucks. NHTSA proposed standards for model years 1996-97 light trucks in December 1992. Final decisions on standards for these years are expected later this year. NHTSA also must establish light truck standards for the post-1997 time frame.

Next Mtg, 14th at 5pm.

Possible Agenda for Big Three/Task Force Meeting

I. Understanding how the design/manufacturing process works

A. What is the process, including timeframes, from concept to production for (i) a new platform; (ii) new models on an existing platform; (iii) modifications to existing models

B. How does this process work with respect to major components such as engines, drive trains, and fuel systems, and how does the component process fit into the model process

C. What are the factors that make something harder or easier to produce, cheaper or more expensive?

D. How is all of this changing, particularly with respect to design, manufacturing process, and labor relations

II. Understanding the major regulatory issues from the companies' perspective

A. What are the characteristics of regulation that make things difficult, such as (i) lead time; (ii) technology forcing; (iii) manufacturing difficulty; (iv) maintenance difficulty (durability); (v) interactions; (vi) cost; (vii) conflicts with consumer demands (e.g., performance); (viii) competitive advantages or disadvantages

B. How do these rank?

C. What are the current major problem areas, and why

D. What are the expected major problem areas, and why

III. Understanding what would make attainment of broad government goals -- e.g., reduction of petroleum use, cleaner air (both greenhouse and smog), safety -- more cost effective, efficient from companies' perspective

IV. Companies' suggestions on how to move toward achivement of system that leads to attainment of government goals in a manner that has reduced negative consequences for the industry

Motor Vehicle Industry Calendar - As of August 10, 1993

	External-General	External-Auto	Treasury	Commerce (see also Trade)	Labor	Transportation	Energy	EPA	Trade
Ongoing		California emissions standards, potential adoption by other states	Minivan tariff issue Nissan Pathfinder case on appeal - argument in fall	Clean car initiative	(i) Reform of worker adjustment programs; (ii) reform of training for employed workers and of the school-to-work transition; (iii) pension reform	(i) Lt truck automatic restraints (MY95-98); (ii) mandatory air bags (cars MY97-98; lt trucks MY 98-99); (iii) mandate tougher dummy stds (MY97 proposed); (iv) lt truck roof strength (MY95); (v) rollover protection; (vi) upgraded fuel system protection standard; (vii) antitheft parts marking; (viii) car and light truck CAFE	(i)Clean car initiative; (ii) activities to support federal puchase of alt fuel veh; (iii) studies, programs, demonstrations, data collection, collaborative efforts, testing programs on alternative fuels	(i) Clean Air new source review; (ii) position in CA emissions litigation EPA not yet a party	
April 1993							(i) Propose rule establishing fuel economy equivalence of electric vehicles for CAFE; (ii) consumer info and assistance to FTC on alternative fuel vehicles and labeling; (iii) 5-year program plans on electric vehicles, advanced diesel emissions, advance diesel engine		
May 1993		Meeting with Michigan delegation-5/11				Spring - Requirements, effective MY95, for manufacturers to label domestic content of cars and light trucks	(i) Quarterly mtg w/ automakers on alternative fuels; (ii) Clean Car Veh Conference, Exposition, Grand Prix, Atlanta, GA		

	External-General	External-Auto	Treasury	Commerce (see also Trade)	Labor	Transportation	Energy	EPA	Trade
June 1993		6/23-25 - Start of UAW/big three collective bargaining.					Clean Cities Award to Philadelphia		
July 1993							(i) Begin solicitation for acq. of alternative fuel veh for fedl fleet (11,000+ for FY94); (ii) select proposals to accelerate near- and mid-term development of passenger and hybrid vehicles (EPAct 2022)	(i) Onboard refueling public hearing; (ii) workshop on diagnostics information for repair facilities was anticipated to be problematic. will not be.	
August 1993						Next step in the GM pickup call.	(i) Complete fabrication and continue eval of 10Kw PEM breadboard fuel cell system; (ii) hybrid vehicle contract award(s) announced; (iii) report to Congress on purchasing policies of Fed Govt which inhibit or prevent fedl purch of alt fuel veh; (iv) issue proposed draft guidelines to fedl agencies to measure alt fuels in hybrid fleet (EPAct 308); (v) solicit proposals for advanced diesel emissions program (EPAct 2027); (vi) grants to states for use on programs related to heavy duty alt fueled vehicles		Preparation for auto basket negotiations with Japan

	External-General	External-Auto	Treasury	Commerce (see also Trade)	Labor	Transportation	Energy	EPA	Trade
September 1993	Appropriations bills completed Health care introduced NAFTA introduction (tentative) Release of National Action Plan ~~Program~~ on climate change (tentative)	9/1 - UAW picks strike target; UAW contracts expire 9/14 9/93-9/94 - UAW contracts with auto parts manufacturers expire.		Complete clean car initiative 9/9 - Auto Parts Advisory Committee Meeting	Probable release of pension reform legislative proposal	conformity regs match the DOT RIPS with the EPA SIPs. performance Regs		(i) Final rules req clean burning gasoline beg in 1995 in high pollution areas; (ii) Clean Air proposed rules for more rigorous monitoring from pollution sources No direct effect on auto industry, but is not b/c of its impact on methanol	Probable beginning of auto parts negotiations with Japan 9/15 - due date for EC submission to GATT re CAFE fines, gas guzzler and luxury taxes
October 1993						MY94 items: (i) 10% of car fleet to meet dynamic side impact stds (all by MY97); (ii) 90% lt trucks to meet static side impact stds (all by MY95); (iii) light truck third brake lamp; (iv) light truck CAFE of 20.5 mpg	(i) Solicit proposals for (a) electric vehicle infractrusture research and demonstration, (b) advance diesel emissions program, (c) high efficiency heat engines; (ii) publish NPRM on guidelines for state alternative fuels and alternative fuel vehicles incentives and plans (EPAct 409); (iii) select proposals for R&D coop agreements for electric motor vehicles	Final rule for tailpipe stds for gaseous fueled vehicles (CNG and LPG) conformity regs.	Tokyo motor show, high level transportation MOSS talks, probably auto basket meeting Trade negotiating group meeting with Korea re autos and auto parts 10/15 - due date for US submission to GATT panel Continuing auto basket talks (through December)

	External-General	External-Auto	Treasury	Commerce (see also Trade)	Labor	Transportation	Energy	EPA	Trade
November 1993	States req to develop operating permit programs for air pollution sources, can charge annual fees for emissions	requirement of CAA is that states submit stationary source info					(i) Fuel cell proof-of-concept bus testing begins; (iii) info and tech asst programs to promote alt fuel vehicles in Fedl agencies (EPAct 305); (iii) distribute gas mileage guide	Final rule for diagnostics for repair facilities	
December 1993						ANPRM on car anti-lock brakes required by Statute. Anti-lock would be Standard by MY 97	(i) Materials on alternative fuels and vehicles for consumers (EPAct 405); (ii) hearings on proposed guidelines for State alternative fuels and alt fueled vehicles incentives and plans (EPAct 409); (iii) submit to Congress 5-year program plan for technologies to reduce oil and gas demand for transportation (EPAct 2021)	Proposed rules to control emissions of toxic air pollutants from new or modified facilies	Deputy-level review of auto negotiations (through January)
January 1994							(i) Acquire voluntary commitements from fuel and vehicle suppliers and fleet owners to provide and use alternative fuel vehicles and fuels; (ii) issue rule on alcohol fuels and cold start requirements	Final rule on on-board vapor control devices for 1998+	Projected NAFTA implementation. Probably President/Japanese Prime Minister meeting on framework
February 1994	FY 1995 budget								

	External-General	External-Auto	Treasury	Commerce (see also Trade)	Labor	Transportation	Energy	EPA	Trade
March 1994	G-7 jobs summit(?)							Final rule for clean fleet heavy duty engines	
April 1994								(i) Final rule for California clean fuels pilot program; (ii) final rule for clean fleet standards for cars and light trucks	
May 1994								Final rule for nonroad diesel engines above 50 hp	

IMPORT AUTO SALES UP IN JAPAN DURING JULY, ASSOCIATION REPORTS

TOKYO -- Sales of cars imported into Japan from so-called Japanese transplants --Japanese-owned factories in the United States -- as well as by the Big Three U.S. automakers surged ahead in July, lifting overall sales of imported automobiles 11.2 percent higher year-on-year to 20,364 units, for the sixth straight monthly expansion, the Japan Automobile Importers Association reported Aug. 5.

The July figure has brought to 118,684 the number of imported car sales in Japan during the first seven months of this year, up 13.2 percent over a year ago.

July's surge followed a 14.5 percent rise in June. July's imported auto sales, including those of Japanese transplants, accounted for 4.2 percent of total domestic vehicle sales and 5.9 percent of car sales, according to data from JAIA and the Japan Automobile Dealers Association. July's domestic vehicle sales were down 10.3 percent year-on-year at 485,566 units and car sales totaled 341,046, down 10.8 percent.

When imports from Japanese overseas transplants are excluded, July's imported vehicle sales still were up 6.4 percent at 16,449 units, the sharpest rise in months, according to JAIA.

Kunihiko Ono, a JAIA official, said so-called pure imported car sales turned higher in July in response to price cuts by U.S. manufacturers, input of new models by U.S. makers and sales efforts by German car makers to take advantage of the summer bonus season.

Mercedez Benz and BMW are offering low interest rate loans, which are as low as 3.5 percent. Chrysler Corp. lowered the prices of its Jeep models in response to the yen's appreciation against the dollar.

However, Ono said it was premature to conclude that sales of pure foreign imports will continue expanding. ''It could have been a temporary trend related to the bonus season,'' he said.

The U.S. Big Three manufacturers' sales jumped 46.8 percent to 2,065 units. Their market share against total imports stood at 10.79 percent, the first time the figure crossed the 10 percent threshold since JAIA started compiling the data.

General Motors Corp. sold 841 units, down 0.8 percent. However, Ford Motor Co.'s sales leaped 72.7 percent to 627 and those of Chrysler Corp. were up 306.2 percent at 597.

Ford is making a rigorous sales pitch to Japanese consumers, running ads in major Japanese newspapers. GM, which is selling its cars through Yanase & Co. and other dealerships, is running television commercials.

Sales of Japanese cars imported from U.S.-based transplants continued brisk. Honda America Manufacturing sold 2,965, up 17.8 percent, after registering a 90.1 percent rise in June. Toyota Motor Corp. sold 744 units, up from 674 in June.

British car sales totaled 1,666, up 6 percent on year, after rising 44.5 percent in June. The Rover group's sales totaled 1,360, up 14 percent; Rolls Royce 27, up 12.5 percent; and Jaguar 134, up 0.8 percent.

German car sales totaled 9,663, down 2.8 percent, after falling 10.3 percent in June. The Volkswagen-Audi group sold 2,419, down 48.8 percent, after suffering a 57.8 percent drop in June. BMW sold 2,539, up 5.7 percent; Mercedes Benz 2,660, up 12.9 percent; and Porsche 165, down 52 percent. Adam Opel cars, sold by Yanase, totaled 1,880, up 110 from a year ago and 1,244 in June.

French car sales totaled 533, down 40.4 percent; Italian cars 492, up 24.6 percent; Swedesh 1,318, up 49.1 percent; and South Korean 38, down 59.1 percent.

GAO

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Resources, Community, and
Economic Development Division

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August 3, 1993

The Honorable Max Baucus
Chairman
The Honorable John H. Chafee
Ranking Minority Member
Committee on Environment and Public Works
United States Senate

The Honorable Norman Y. Mineta
Chairman
The Honorable Bud Shuster
Ranking Minority Member
Committee on Public Works and Transportation
House of Representatives

Motor vehicles are the dominant source of many of the air pollutants that contribute to environmental problems in many urban areas. Excessive levels of ozone and carbon monoxide in urban areas are linked to a variety of health effects, including lung and cardiovascular disease. In 1989, the Office of Technology Assessment estimated that the value of the health benefits to be realized by meeting federal ozone standards could range between $1.3 billion and $9.5 billion annually.[1]

This report responds to your request that, as part of our review of the implementation of the Intermodal Surface Transportation Efficiency Act (ISTEA), we examine the use of transportation control measures (TCM) to control mobile source emissions. TCMs are programs or activities that states and localities can implement to encourage the traveling public to rely less on the automobile or to use the automobile more efficiently. These programs include traditional approaches, such as improving commuter train service, encouraging employer-provided carpooling incentives, and synchronizing traffic lights to improve the flow of traffic. They also include economic measures, such as imposing regional gasoline taxes and motor vehicle emissions fees. Specifically, we agreed to (1) review evidence on the effectiveness of TCMs in reducing pollution and (2) assess the prospects for implementing TCMs in areas that have not attained federal air quality standards for ozone and carbon monoxide. To meet these objectives, among other things, we conducted a nationwide

[1]Catching Our Breath: Next Steps for Reducing Urban Ozone, Office of Technology Assessment (Washington, D.C.: U.S. Government Printing Office, May 1990).

survey of 119 metropolitan planning organizations in ozone and carbon monoxide nonattainment areas.

Results in Brief

Our nationwide survey, reviews of federal and state air quality studies, and discussions with transportation and air quality experts revealed that the traditional TCMs listed in the Clean Air Act Amendments of 1990 (CAAA) are projected to reduce regionwide hydrocarbon and carbon monoxide emissions from 0 to 5 percent of total emissions. We found a strong consensus among transportation planners that TCMs are complementary programs that will supplement improvements in emissions technology, cleaner fuel, and vehicle inspection and maintenance programs. TCMs have traditionally been used to reduce congestion and fuel consumption and will play a growing role in transportation planning. ISTEA and CAAA contain funding and enforcement provisions that will encourage states to emphasize TCMs in the future. Fifty-six percent of the surveyed metropolitan planning organizations stated that TCMs would receive strong emphasis in their transportation programs in the next 5 years (1993-98). Only 8 percent of the surveyed metropolitan planning organizations reported that TCMs had received strong emphasis in their programs during the last 5 years (1987-92).

Further research on the effectiveness of TCMs may also enhance the prospects for implementing them. Current evidence is outdated and depends on models that do not reliably measure the effects of TCMs on travelers' behavior. In using traditional TCMs—such as mass transit, ridesharing, and traffic signal synchronization—transportation planners will be challenged by trends toward greater public reliance on the automobile and low-density land use that undermines the viability of alternatives to the single-occupant vehicle.

We found a strong consensus that market-based TCMs—financial disincentives that change travel behavior, such as gasoline taxes or emissions fees—may be more effective than traditional TCMs in reducing automobile use. These measures may be particularly important, since traditional TCMs target the home-to-work commute, which in 1990 accounted for only one-fourth of all vehicle trips—about a 6-percent decline since 1969. According to a recent analysis in the San Francisco Bay region, an extensive program of traditional TCMs would reduce carbon monoxide emissions by 5.4 percent; the inclusion of several market-based measures would reduce emissions by 22.5 percent. Department of Transportation (DOT) and Environmental Protection Agency (EPA) officials

are encouraging states to implement market-based TCMs. However, since these measures add to the cost of driving, they are economically and politically painful; 80 percent of the surveyed metropolitan planning organizations agreed that public resistance to these measures made their implementation highly unlikely. Localities that find market-based TCMs unfeasible may obtain maximum benefits from traditional TCMs through several approaches, including focusing on specific congested corridors and implementing TCMs that reduce the number of trips as well as the number of vehicle miles traveled.

Background

Motor vehicles contribute substantially to high levels of ozone and carbon monoxide—two of the most widespread air quality problems in the United States.[2] Federal policy has long promoted a variety of approaches to reduce air pollution from motor vehicles, including improving emissions technology, developing cleaner fuels, and introducing vehicle inspection and maintenance programs. In addition, federal transportation and clean air policies have sought to reduce emissions and traffic congestion through TCM programs that range from installing bicycle storage facilities at transit stations to establishing high-occupancy-vehicle (HOV) lanes and regionwide carpooling programs. TCMs also include mandatory employer-based programs, such as Regulation XV in California's South Coast Air Basin. This program requires large employers to increase the average occupancy of vehicles arriving at the workplace in order to reduce overall automobile use. Appendix I includes a detailed list and description of these measures.

CAAA and ISTEA emphasize the role of TCMs in state and local efforts to reduce emissions from transportation sources. These laws also allow considerable flexibility in the use of TCMs. CAAA requires states to submit state implementation plans outlining their efforts to meet federal air quality standards. CAAA also requires that states with severe and extreme ozone nonattainment areas use TCMs to offset the growth in emissions due to increases in vehicle miles traveled. Furthermore, CAAA lists 16 TCM strategies that states and localities can include in their transportation plans. ISTEA reinforced the CAAA mandates by limiting the use of federal transportation funds in areas violating federal air quality standards. For example, ISTEA states that, in certain nonattainment areas, federal funds may not be used for highway projects that will significantly increase the

[2]Motor vehicles do not emit ozone. Rather, they emit hydrocarbons that undergo chemical reactions in the atmosphere and produce ozone.

carrying capacity for single-occupant vehicles unless such projects are part of an approved congestion management system.

Impact of TCMs on Reducing Emissions May Be Modest

Projections of the impact of TCMs on reducing regional hydrocarbon and carbon monoxide emissions generally range from less than 1 percent to 5 percent. Experts we spoke to generally regarded TCMs as incremental, supportive measures that supplement other approaches, such as improvements in emissions technology and cleaner fuels, which are expected to yield far greater reductions in emissions.

Table 1 shows the range of reductions in emissions expected from TCMs, as found in our survey and cited in other studies. Only in California's South Coast region does the predicted reduction in emissions significantly exceed the range cited in national studies.

Table 1: Projected Role of TCMs in Reducing Total Hydrocarbon and Carbon Monoxide Emissions

Source of projection	Percent reduction in hydrocarbon emissions	Percent reduction in carbon monoxide emissions
1992 GAO survey	0-3	0-3
1992 Federal Highway Administration[a]	2-5	2-5
1991 and 1992 California[b]		
South Coast	4.0	10.8
San Diego	4.1	N/A[c]
Bay Area	2.1	5.4

Note: The percentages in this table are projections, not actual results.

[a]Percentages based on Federal Highway Administration estimates.

[b]These three California air quality plans were prepared in accordance with the California Clean Air Act of 1988. The South Coast encompasses metropolitan Los Angeles, and the Bay Area encompasses San Francisco and Oakland.

[c]Data not available.

According to our nationwide survey of metropolitan planning organizations in ozone and carbon monoxide nonattainment areas, transportation planners generally expect TCMs to reduce emissions by less than 1 percent to 3 percent. Eighty-three percent of the ozone nonattainment metropolitan planning organizations expressing an opinion said that TCMs could reduce emissions by 0 to 3 percent. Ten percent expected reductions in emissions of between 4 and 10 percent, and 6 percent expected reductions of over 10 percent. Eighty percent of

carbon monoxide nonattainment metropolitan planning organizations expressing an opinion expected reductions in emissions of 0 to 3 percent. Thirteen percent expected reductions of between 4 and 10 percent, and 7 percent expected reductions of over 10 percent.[3]

Although some metropolitan planning organizations did not know by how much TCMs would reduce hydrocarbon or carbon monoxide emissions, DOT and EPA officials expected that traditional TCMs would continue to reduce emissions by 0 to 5 percent. A 1992 Federal Highway Administration (FHWA) report, which summarized key issues in air quality and transportation planning, concluded that typical TCMs would rarely yield more than a 5-percent reduction in emissions and in most cases would not yield more than a 2-percent reduction. A 1983 FHWA report summarizing the 1982 state implementation plans found that TCMs would serve to supplement other control strategies, such as improvements in automobile technology. The FHWA report also found that 24 to 47 percent of the expected reductions in hydrocarbon emissions would come from industrial and other stationary source controls, 41 to 62 percent from motor vehicle emissions controls, and 8 to 14 percent from automobile inspection programs. TCMs would contribute reductions of 1 to 7 percent and in most cases well under 5 percent.

The three California plans prepared under California state law project a 2.1- to 4.1-percent reduction in hydrocarbon emissions and a 5.4- to 10.8-percent reduction in carbon monoxide emissions. However, some assumptions in these plans about the effects of implementing TCMs on travel habits may be optimistic. For example, the South Coast Air Quality Management Plan incorporates a regulation designed to increase the number of occupants per vehicle to 1.5.[4] However, a subsequent analysis of the plan found that, to achieve this goal, about two-thirds of the work force would have to take carpools to their workplace. Such a level of participation could be difficult to achieve.

Our reviews of transportation and air quality literature and interviews with experts generally supported our overall findings on the effectiveness of TCMs. Virtually none of the literature we reviewed or the persons we

[3]Forty-six percent of the metropolitan planning organizations did not know what reductions in hydrocarbon emissions TCMs would provide. Twenty-seven percent did not know what reductions in carbon monoxide emissions TCMs would provide.

[4]This requirement, known as Regulation XV, requires all employers in the region with 100 or more employees to increase the number of occupants per vehicle arriving at the workplace. The target for average vehicle occupancy varies geographically, but the target for the largest area—the developed urban and suburban parts of the air quality district—is 1.5.

interviewed stated that TCMs would significantly reduce emissions. Nearly all discussions of the impact of TCMs on air quality emphasized their modest but complementary role. For example, the Manager of the National Association of Regional Councils' (NARC) Clean Air Project stated that TCMs should be viewed as incremental, supportive measures rather than as the bedrock of an air quality improvement program. He noted that improvements in tailpipe emissions control technology, automobile inspection programs, and cleaner fuels would be the keys to lowering emissions from motor vehicles.

ISTEA and CAAA Will Encourage TCM Implementation, but Challenges Remain

As a result of ISTEA and CAAA, states and metropolitan planning organizations will include more TCM programs in their transportation and clean air plans over the next 5 years. Provisions such as ISTEA's Congestion Mitigation and Air Quality Improvement Program (CMAQ) and CAAA's highway fund sanctions will encourage greater implementation of TCMs. Moreover, additional research on the effectiveness of TCMs may further encourage states and metropolitan planning organizations to implement TCM programs. Current evidence on the effectiveness of TCMs is outdated and relies on models that may not accurately measure the effects of TCMs on commuters' behavior. In addition, transportation planners will be challenged by trends toward greater public reliance on the automobile and toward low-density land use that undermines the viability of alternatives to the single-occupant vehicle.

ISTEA and CAAA Will Encourage TCM Implementation

Our survey of metropolitan planning organizations found that ISTEA and CAAA will encourage states to implement more TCMs in the future. It found that two of ISTEA's funding provisions—CMAQ and the flexible use of Surface Transportation Program funds—will particularly encourage the planning and implementation of TCMs. Under CMAQ, ISTEA authorized a total of $6 billion (for fiscal years 1992-97) to fund transportation projects that enhance air quality. The Surface Transportation Program gives states broad discretion in the use of funds, allowing them, for example, to fund projects that would promote alternatives to the single-occupant vehicle. Table 2 lists these funding sources and other provisions of ISTEA and CAAA that, according to the surveyed metropolitan planning organizations, will promote the planning and implementation of TCMs.

Partly as a result of these statutory provisions, 56 percent of the surveyed metropolitan planning organizations stated that TCMs would receive strong emphasis in their transportation programs in the next 5 years (1993-98).

Only 8 percent of the surveyed metropolitan planning organizations reported that TCMs had received strong emphasis in their programs in the last 5 years (1987-92).

Table 2: Provisions of ISTEA and CAAA That Encourage the Use of TCMs

Legislative provision	Percentage of metropolitan planning organizations citing provision as positive factor	Possible impact on TCM implementation
ISTEA Congestion Mitigation and Air Quality Improvement Program	96	Program provides $6 billion through 1997 for projects likely to contribute to the attainment of national air quality standards.
ISTEA Flexible Use of Surface Transportation Program Funds	77	States may transfer up to 100 percent of highway funds to support mass transit.
ISTEA-Mandated Management System Addressing Traffic Congestion	74	Management system may encourage implementation of TCMs
CAAA Sanctions	86	State may lose federal highway funds unless it implements TCMs in its implementation plan.
CAAA Transportation Conformity Requirements	88	CAAA requires state transportation plans to agree with state air quality plans and requires expeditious implementation of TCMs.

Information on the Effectiveness of TCMs Is Limited

After considerable research on TCMs in the late 1970s and early 1980s, very little occurred during the balance of the 1980s. According to the manager of NARC's Clean Air Project, little money was available during the 1980s for evaluating and assessing TCMs at the federal, state, or local levels. The Chair of the NARC TCM Advisory Panel said that information on the effectiveness of TCMs is needed to help localities justify their implementation.

In addition, existing models used to predict reductions in emissions from TCM programs have yet to capture accurately the effects of TCMs on travel behavior and therefore on emissions. For example, synchronizing traffic signals can improve traffic flow along densely traveled corridors, thereby

reducing the emissions associated with congestion. The improved flow can be viewed as an increase in capacity. However, the increase in capacity may lead to an increase in demand, as the traveling public takes trips previously forgone because of congestion. Such a reaction may reestablish congestion. According to a modeling expert from the University of California at Los Angeles, each step in the modeling proc has large margins of error.

The results of our survey corroborated the need for better methodologies and data on the effectiveness of TCMs. Half of the surveyed metropolitan planning organizations stated that they did not have adequate information and methodological tools to calculate the impacts of TCMs on emissions. Only 8 percent strongly believed that the tools were adequate, while 30 percent expressed some confidence. Among metropolitan planning organizations in areas of serious, severe, and extreme ozone nonattainment, 59 percent did not believe that the tools were adequate, while 34 percent expressed confidence in their adequacy. According to EPA officials, within the next 2 years, models that can predict shifts in travel behavior resulting from the implementation of TCMs—and, hence, the effects of TCMs on emissions—will be available for states and municipalities to use.

Long-Standing Travel and Land-Use Trends Challenge Efforts to Curb Automobile Use

Recent data on national trends in automobile use show that transportation planners face challenges in changing the public's travel habits. Americans are becoming more, not less, automobile-oriented. Data from DOT's Nationwide Personal Transportation Survey show that the number of vehicles, licensed drivers, and vehicle trips per household steadily increased from 1969 to 1990. In addition, both vehicle trips and vehicle miles traveled increased faster than associated variables, such as the total population. Commuting habits have also deteriorated from the standpoint of controlling emissions. Census data show that the percentage of workers driving to work alone increased from 64 to 73 percent between 1980 and 1990. In contrast, the percentage of the total work force using mass transit or carpools decreased from 26 to 18 percent.

In addition, the home-to-work trip, which TCMs are often designed to address, accounts for a shrinking share of total personal travel. In 1990, the work commute accounted for about 26 percent of all vehicle trips per household—down from 32 percent in 1969. Furthermore, the total number of work trips per household was virtually unchanged from 1969 to 1990, while trips for personal business and shopping increased by 111 and

62 percent, respectively. As the work commute shrinks as a percentage of total vehicle use, transportation planners may find it necessary to implement TCMs that affect other kinds of personal travel. Appendix II contains expanded data on personal travel patterns.

Our nationwide survey confirmed that these trends could limit the effectiveness of TCMs. Seventy-seven percent of the surveyed metropolitan planning organizations responded that regional trends in automobile use could impede the effectiveness of TCMs, while 73 percent said that the level of public willingness to change travel behavior could do so.

In addition, over 70 percent of the surveyed metropolitan planning organizations identified residential and commercial land-use patterns as impediments to the effectiveness of TCMs. Land-use trends in many urban areas have made the single-occupant automobile an increasingly indispensable form of travel. Mass transit and even carpool arrangements are less viable in the sprawling, low-density suburban developments whose growth has characterized many urban areas in recent years. As more people stop commuting to a central business district and begin commuting from suburb to suburb, alternatives to single-occupant vehicles, such as mass transit and ridesharing, become less practical.

Market-Based TCMs and Other Approaches May Maximize Reductions in Emissions

Market-based TCMs—that is, TCMs that impose financial disincentives on the use of automobiles—may be the most effective means of changing emissions-producing travel behavior. Although CAAA does not require the implementation of market-based TCMs, states may enact legislation authorizing or requiring them. Such measures may include an increase in the gasoline tax or a highway congestion pricing program. Sixty-four percent of the metropolitan planning organizations responding to our survey stated that such measures would be more effective in reducing emissions than traditional TCMs. Recent analysis in the San Francisco Bay region shows that market-based TCMs may be far more effective in reducing emissions than the more traditional TCMs. Because such measures would visibly add to the cost of driving, their implementation would probably face strong public resistance. For jurisdictions that find market-based measures politically unfeasible, traditional TCMs may be needed to offset the projected growth in automobile use and to improve mobility. Transportation planners may get optimal results from such TCMs if they focus on localized benefits and ensure that the TCMs promote multiple social goals, complement and reinforce one another, and reduce the number of trips rather than just the number of vehicle miles traveled.

Market-Based Measures May Deter Motor Vehicle Use More Than Other TCMs

We found a strong consensus among transportation and air quality officials that market-based TCMs would be more effective in discouraging automobile use than traditional TCMs. Market-based TCMs can include a wide variety of approaches, such as increased gasoline taxes, highway congestion pricing, and emissions fees.

According to advocates, market-based measures could have the dual benefit of strongly discouraging motor vehicle use and reducing emissions while ensuring that the full costs of driving, including the costs of air pollution and congestion, are borne by those responsible for generating them. Both DOT and EPA officials asserted that such measures would be needed to obtain more than the 0- to 5-percent reductions in emissions typically available from the traditional TCMs listed in CAAA. In part, market-based TCMs could reduce emissions more than traditional TCMs because they can be applied to all types of travel, whereas CAAA's traditional TCMs principally affect the work commute. This distinction is important, especially since the work commute has been shrinking as a portion of total travel.

Our national survey revealed a broad consensus among metropolitan planning organizations that market-based measures could be more effective than other types of TCMs in reducing emissions. Sixty-four percent of respondents agreed that market-based measures could more effectively reduce automobile use than TCMs that do not directly increase the cost of driving. Eleven percent were undecided, and 18 percent disagreed.

At least one metropolitan planning organization has proposed market-based measures. In 1990, the San Francisco metropolitan planning organization proposed a series of user fees to ensure that Bay Area drivers bore the actual costs of driving. The proposal included (1) fees based on a vehicle's emissions output, (2) regionwide freeway congestion pricing, and (3) a $2-per-gallon increase in regional gasoline taxes. With market-based measures included, the Bay Area 1991 Clean Air Plan projected an 8.4-percent decrease for hydrocarbon emissions and a 22.5-percent decrease for carbon monoxide emissions. In contrast, reductions of 2.1 percent for hydrocarbon emissions and 5.4 percent for carbon monoxide emissions were projected without market-based measures. However, these measures have not yet been implemented in the Bay Area. Currently, the Bay Area air quality agency and metropolitan planning organization are working to obtain the state enabling legislation needed for certain market-based measures.

Consumers' responses to recent changes in gasoline prices appear to support the rationale for market-based measures. For example, after oil prices declined in 1986 to almost half their previous level, average daily oil consumption increased to its highest level in 5 years. Conversely, consumption fell in 1990 because of higher oil prices triggered by the Persian Gulf War.

Despite their projected success in reducing emissions, market-based measures may be difficult to implement. Our survey found that 80 percent of the responding metropolitan planning organizations agreed that the public's resistance to market-based measures made their implementation highly unlikely. Our survey and the comments of many interviewees indicated that there was an inverse relationship between the potential effectiveness of market-based TCMs and the likelihood of their being accepted by the public. Critics of these measures stated that they could have an adverse effect on lower-income individuals who have no alternatives to driving to the workplace. Advocates contended that market-based measures could be implemented so as to minimize their regressive effect. For example, the Bay Area Economic Forum proposed that revenues from congestion and emissions fees be used to finance public transportation and other alternatives to single-occupant vehicles.[5]

Benefits From Traditional TCMs Can Be Maximized

Because many areas may find market-based TCMs politically unfeasible, they may have to rely on traditional TCMs in devising strategies for controlling emissions. Evidence we reviewed showed that certain strategies for implementing traditional TCMs could help ensure that they effectively supplement other methods for reducing air pollution and achieve other social benefits. These strategies include focusing TCMs on achieving localized benefits, emphasizing their multiple benefits, ensuring that they complement and reinforce one another, and selecting TCMs that reduce the number of trips as well as the number of vehicle miles traveled.

Focus TCMs on Localized Benefits

Analyses of state plans submitted to EPA under the Clean Air Act Amendments of 1977 found that TCMs could be more effective in solving localized carbon monoxide problems than regional ozone problems. While TCMs were projected to reduce carbon monoxide emissions from less than 1 to 5 percent regionally, they were projected to be more effective in solving localized carbon monoxide problems. For example, in the 1970s and early 1980s, New York City implemented an extensive bus lane

[5]The Bay Area Economic Forum, Market Based Solutions to the Transportation Crisis: Incentives to Clean the Air and Ease Congestion (San Francisco: May 1990).

program. This program was intended to give buses priority as the most efficient movers of people on city streets and to reduce emissions at carbon monoxide hotspots in the city. Subsequent air quality analyses on one corridor found that carbon monoxide emissions dropped by 90 percent in the area of the newly implemented bus lane. This reduction was possible because carbon monoxide violations, unlike ozone violations, are typically very localized.

Similarly, Los Angeles began implementing an automated traffic surveillance and control system in 1984. Since that time, several evaluation studies have found that this system provided notable benefits compared with the system it replaced. The studies of the most recently evaluated areas indicate that emissions were reduced by 14 percent, travel time was cut by 18 percent, and fuel consumption was lowered by 13 percent.

In addition, a 1992 EPA review of TCM benefits found that the TCMs listed in CAAA have influenced travelers' behavior, sometimes significantly, for particular target groups. For example, in 1985, a California Telecommuting Pilot Project led to a 30-percent reduction in the home-to-work trip rate among program participants. Emissions of hydrocarbon and carbon monoxide were reduced by a comparable percentage.

Emphasize Complementary TCMs With Multiple Benefits

TCM packages could include elements that would complement and reinforce rather than counteract one another. Complementary TCMs could enhance efforts to address both regional and localized emissions problems. For example, regionwide car pool or van pool programs combined with a network of HOV lanes would reinforce one another. However, widespread use of alternative work schedules, such as flextime programs, could undermine a ridesharing program, since different work schedules would be incompatible with time-specific ridesharing arrangements. Nonetheless, alternative work schedules could help reduce congestion during peak travel hours and thereby improve the flow of traffic.

In addition, TCMs could be implemented to promote multiple social goals, such as conserving fuel and reducing congestion as well as reducing emissions. DOT has encouraged the use of TCMs to improve mobility and reduce congestion since the 1960s and cited them as means for conserving fuel during the oil crises of the 1970s. Our national survey found that metropolitan planning organizations in nonattainment areas view reducing congestion and improving mobility as more important benefits of TCMs than reducing emissions. Fifty-four percent of the responding metropolitan

planning organizations said that reducing congestion and improving mobility are the most important benefits of TCMs, while 39 percent said that reducing emissions was the most important. TCMs may be more easily implemented when they achieve noticeable reductions in congestion as well as less noticeable improvements in air quality.

Implement TCMs That Reduce Numbers of Trips

TCMs designed to reduce numbers of trips are more likely to reduce emissions than TCMs aimed only at reducing numbers of vehicle miles traveled. Motor vehicles emit hydrocarbons (1) during the cold start phase, which occurs during the first few minutes of operation when the vehicle's catalytic converter is cold and is not functioning at full capacity; (2) under regular running conditions; and (3) during the hot soak phase, which occurs after the engine has been turned off and the engine's heat causes gasoline still in the carburetor or fuel system to evaporate.

Because of cold start and hot soak emissions, a 5-mile trip may produce nearly as much hydrocarbon emission as a 10-mile trip. Therefore, a telecommuting TCM program that lets employees work at home could reduce both the number of trips by commuters and the emissions associated with the cold start and hot soak phases.

Conclusions

DOT has long encouraged states and localities to use TCMs to improve mobility and reduce congestion. ISTEA and CAAA elevated TCMs to greater importance as means of addressing air pollution problems. Although TCMs may be projected to reduce overall emissions by less than 5 percent, they can complement other programs specifically designed to address pollution problems in the nation's nonattainment areas. Moreover, the additional reductions in emissions resulting from traditional TCM programs may help localities meet the attainment standards mandated in CAAA. If localities require additional measures to reduce automobile use and improve air quality, they may need to implement market-based TCMs. Although pricing measures are projected to be more effective than traditional TCMs in reducing air pollution, they are also less acceptable because their implementation would directly increase costs for the traveling public.

Regardless of the types of TCMs that localities and states implement, more research on the effectiveness of TCMs is clearly needed. Because transportation planners nationwide will be re-emphasizing the need for TCMs in the next 5 years, this period offers an opportunity for updating experience-based analyses of TCMs. Assessments of the impact of TCMs on reducing emissions will both provide needed updates to the literature on

TCMs and, if traditional TCMs prove ineffective, help transportation planne justify market-based measures in the future.

Recommendations

ISTEA and CAAA give states and localities flexibility in using TCMs to control emissions. However, more information on the effectiveness of TCMs is clearly needed, particularly so that states can better plan for their use. Therefore, we recommend that the Secretary of Transportation and the Administrator of the Environmental Protection Agency

- require local areas to assess the impact of implemented TCMs on reducing emissions and
- cooperate in gathering and disseminating this updated information to states and localities in ozone and carbon monoxide nonattainment areas.

Agency Comments

We met with the Chief of FHWA's Noise and Air Quality Branch, environmental specialists at the Federal Transit Administration, the Chief of the Transportation Section of EPA's Office of Mobile Sources, and other DOT and EPA officials to discuss the facts, conclusions, and recommendations in this report. Where appropriate, we incorporated their comments. In general, agency officials agreed with our findings and conclusions. In particular, they concurred with the need for market-based measures and additional data on the effectiveness of TCMs. As agreed with your offices, we did not obtain written agency comments on a draft of this report.

Scope and Methodology

We surveyed 119 metropolitan planning organizations in areas that had not attained federal air quality standards for ozone and carbon monoxide. We received responses from 100 metropolitan planning organizations, including all of the organizations from the areas with the most serious air quality problems. A copy of sections I through III of the questionnaire with the final results appears in appendix III of this report.[6] We obtained information from metropolitan planning organizations on the factors that could impede and facilitate the implementation of TCMs in their areas. We reviewed and analyzed the results of DOT's 1990 Nationwide Personal Transportation Survey and data on personal travel from the 1990 Census. We conducted site visits and interviewed officials from the respective

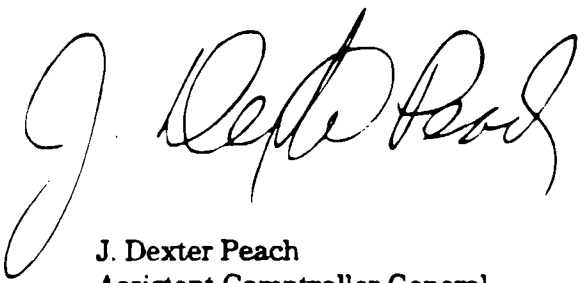
[6]Only sections I through III of the questionnaire apply to this work. Section IV, which focuses on the effects of TCM exemptions on the use of alternative fuels, appears in a separate report. See Alternative Fueled Vehicles: Potential Impact of Exemptions From Transportation Control Measures (GAO/RCED-93-125, Apr. 19, 1993).

metropolitan planning organizations as well as state transportation and air quality officials in six nonattainment cities: Chicago, Houston, Los Angeles, Philadelphia, San Diego, and San Francisco. We also interviewed officials at the Federal Highway Administration, the Federal Transit Administration, the Environmental Protection Agency, and the National Association of Regional Councils, as well as other experts on transportation and air quality.

A list of the literature we reviewed on the effectiveness of TCMs in reducing emissions appears in the bibliography. We conducted our work between July 1992 and March 1993 in accordance with generally accepted government auditing standards.

We will send copies of this report to interested congressional committees; the Secretary of Transportation; the Administrator, Federal Highway Administration; the Administrator, Federal Transit Administration; and the Administrator, Environmental Protection Agency. We will make copies available to others upon request.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached on (202) 512-2834. Other major contributors to this report are listed in appendix IV.



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Overview of the U.S. Automotive Industry

Briefing for the NEC
by
The U.S. Department of Commerce

The Size of the Auto Industry

The motor vehicle and parts industries are a large segment of the U.S. economy

- In 1992, auto industry production represented 5.6% of national GDP
  - Vehicles: 3.6%
  - Parts: 2.0%
- In 1992, vehicle and parts manufacturing directly accounted for 4.6% of total manufacturing employment
  - Vehicles: 1.4%
  - Parts: 3.2%
- In 1992, direct and indirect auto industry employment accounted for 4 out of 7 manufacturing jobs

Source: Bureau of Labor Statistics and Bureau of Economic Analysis

The Importance of the Auto Industry

The vehicle and parts industries are vital segments of the U.S. economy

- Every $1.00 spent on motor vehicles and parts generates $2.50 of expenditure and income

- In 1991, consumer spending on the purchase and operation of automobiles represented *10.4%* of total personal consumption ($405 billion)

- In 1991, the auto industry accounted for 5.6% of total manufacturing plant and equipment expenditures ($10.3 billion)

Source: Bureau of Labor Statistics and Bureau of Economic Analysis

Auto Industry Segments

The auto industry includes a wide range of business activities and can be divided into broad segments

- **Vehicle manufacturing**
- **Parts manufacturing**
- **Dealers & service**

Historical Overview

Decade	Status	Issue
1950's	• Total market dominance by U.S. manufacturers	• Growing capacity to meet growing demand
1960's	• Total market dominance, but imports at 5%	• Imports concentrated in sports/luxury/entry level vehicles
1970's	• Still dominant, but import share growing	• Japanese enter market aggressively • Oil stocks promote smaller cars

Historical Overview
(continued)

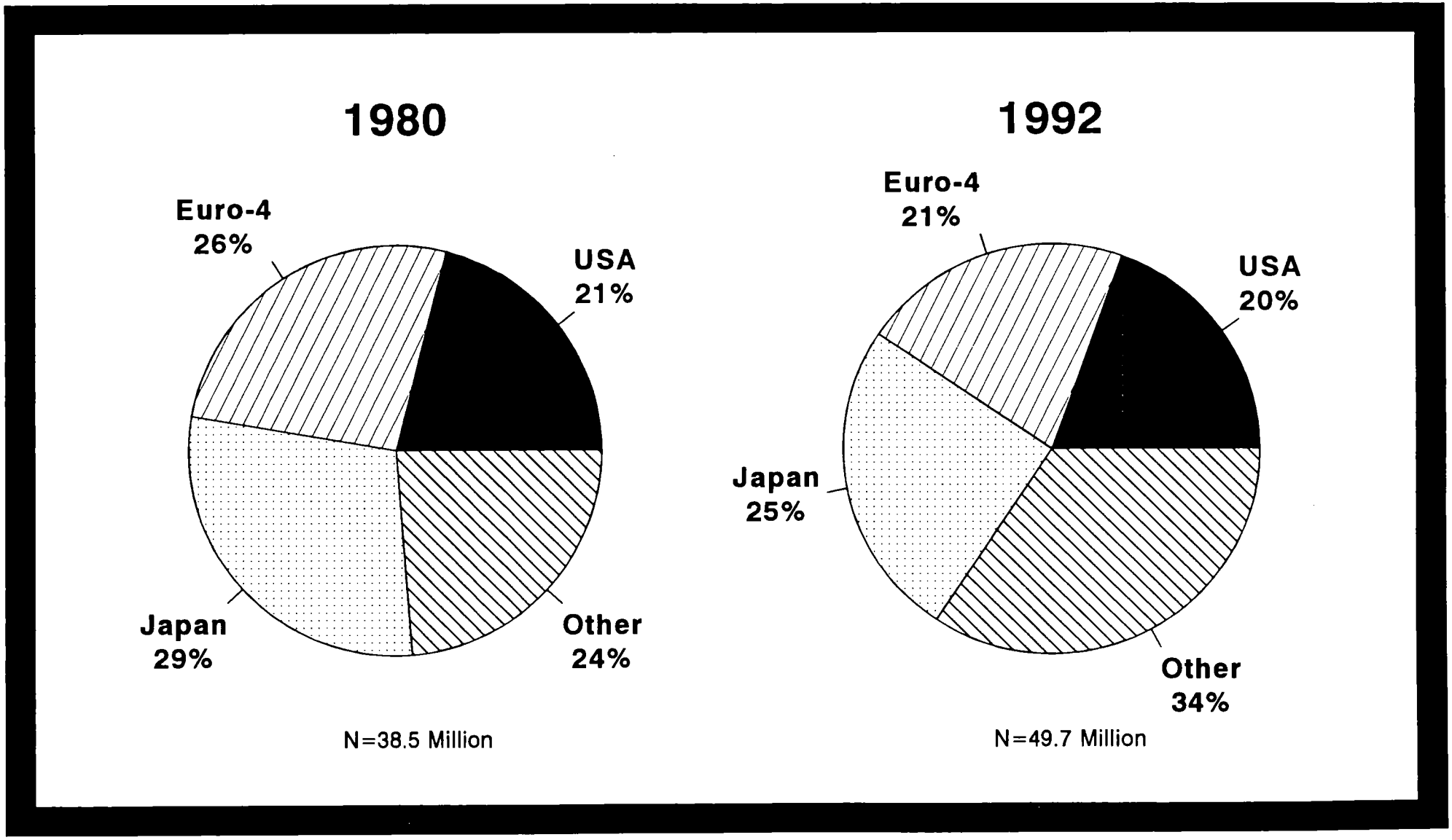
Decade	Status	Issue
1980's	• U.S. car companies have dominant market shares	• Overcapacity
	• Imports have 25% of market	• Japanese automobile export restraints
	• NAM's have 18% by the end of the decade	• Competitive pressures greatly increase
	• Auto parts trade balance turns sharply negative	• 1982: Japanese production begins in U.S.
		• Sharp revaluation of yen/dollar exchange rate

Historical Overview
(continued)

Decade	Status	Issue
1990's	• Big 3 beginning to regain share in light vehicle sales	• 1990-92: weak market
	• Transplant share increase slowing (1990-92)	• Overcapacity remains
	• Japanese import decline continues	• Time compression of design/production process
	• Traditional suppliers gradually expanding sales to NAM's; U.S. share in single digits	

U.S. Share of Wor d Product on Dec ned

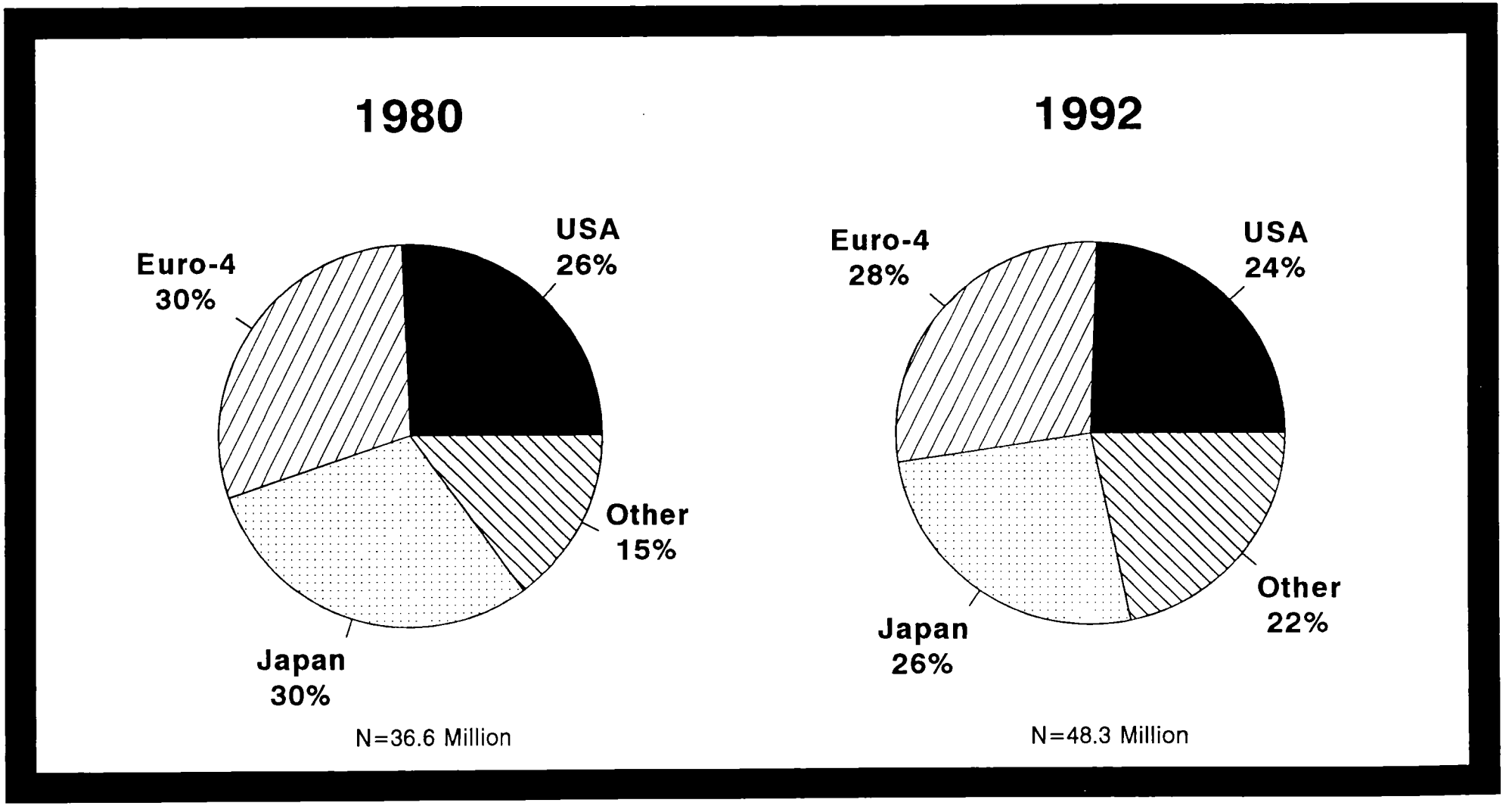
U.S., Japanese and European-based production has steadily declined, while production in the rest of the world has increased



Source: AAMA, Automotive News, Ward's Automotive Reports, U.S. Department of Commerce
Euro.-4 = Germany, France, UK, Italy

Global Vehicle Sales By Country of Origin

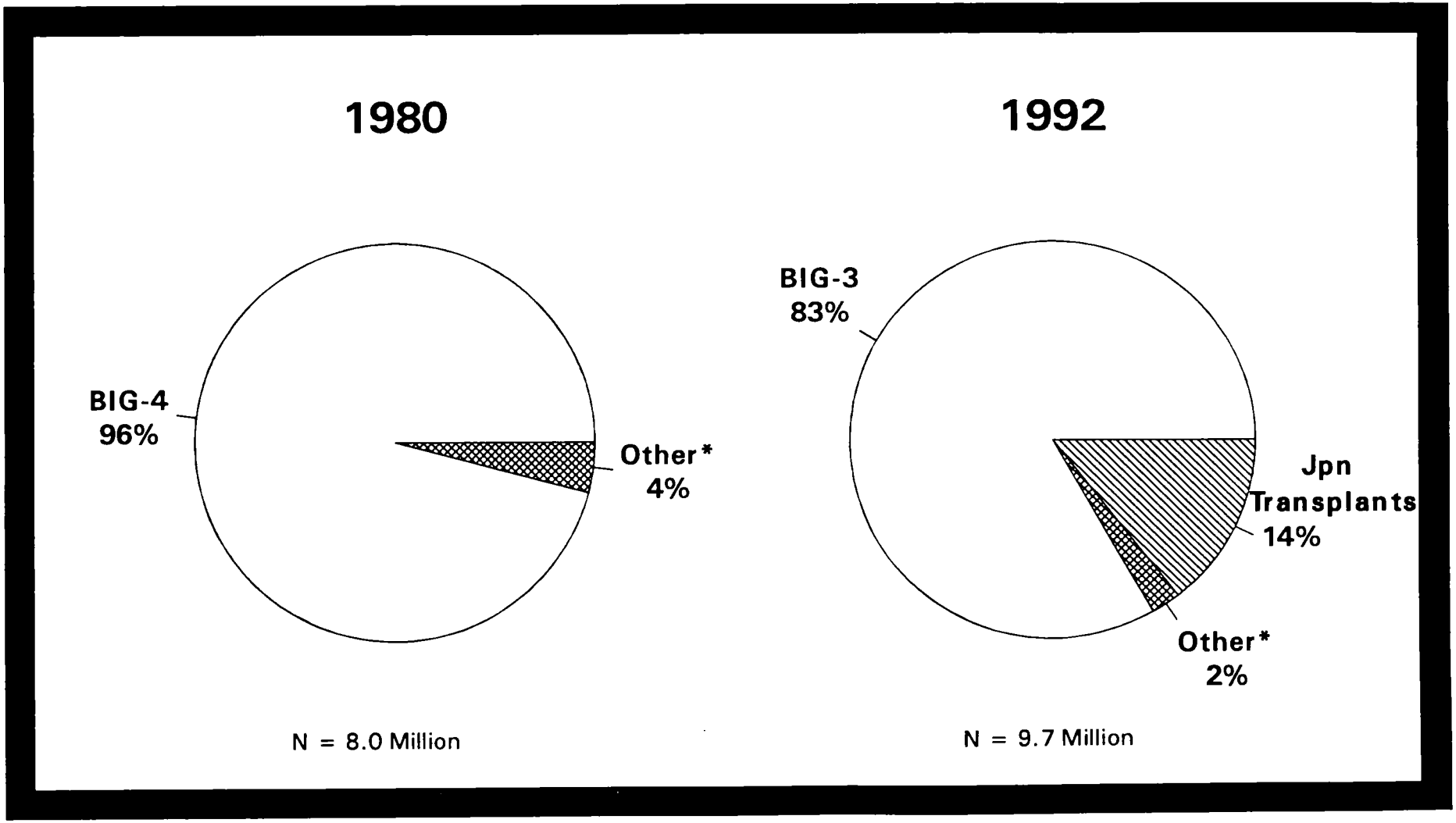
Japan's share has declined because of efforts to "export" transplant production facilities



Source: AAMA, Automotive News, Ward's Automotive Reports, U.S. Department of Commerce
Euro.-4 = Germany, France, UK, Italy
Sales by Country of Origin = Sales of Locally Made + Export Shipments of Locally Made

Composition of U.S.-Based Production (Including Trucks)

Japanese share of U.S. production increased because of the transplants



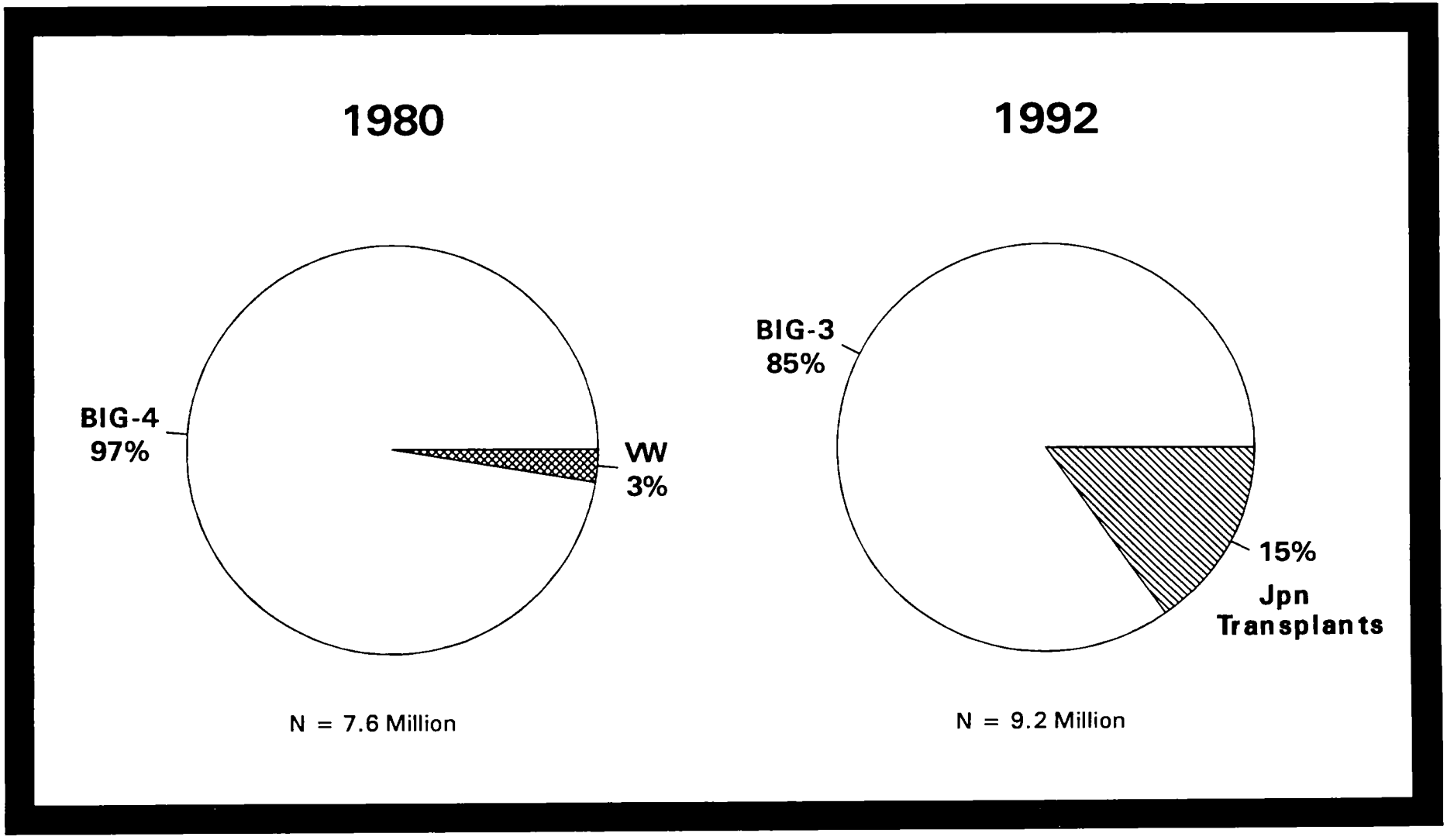
Source: Ward's Automotive Reports

* Other = VW (1980 only) and Independent Truck Companies

Note: Production based on company nameplate

Composition of U.S.-Based Light Vehicle Production

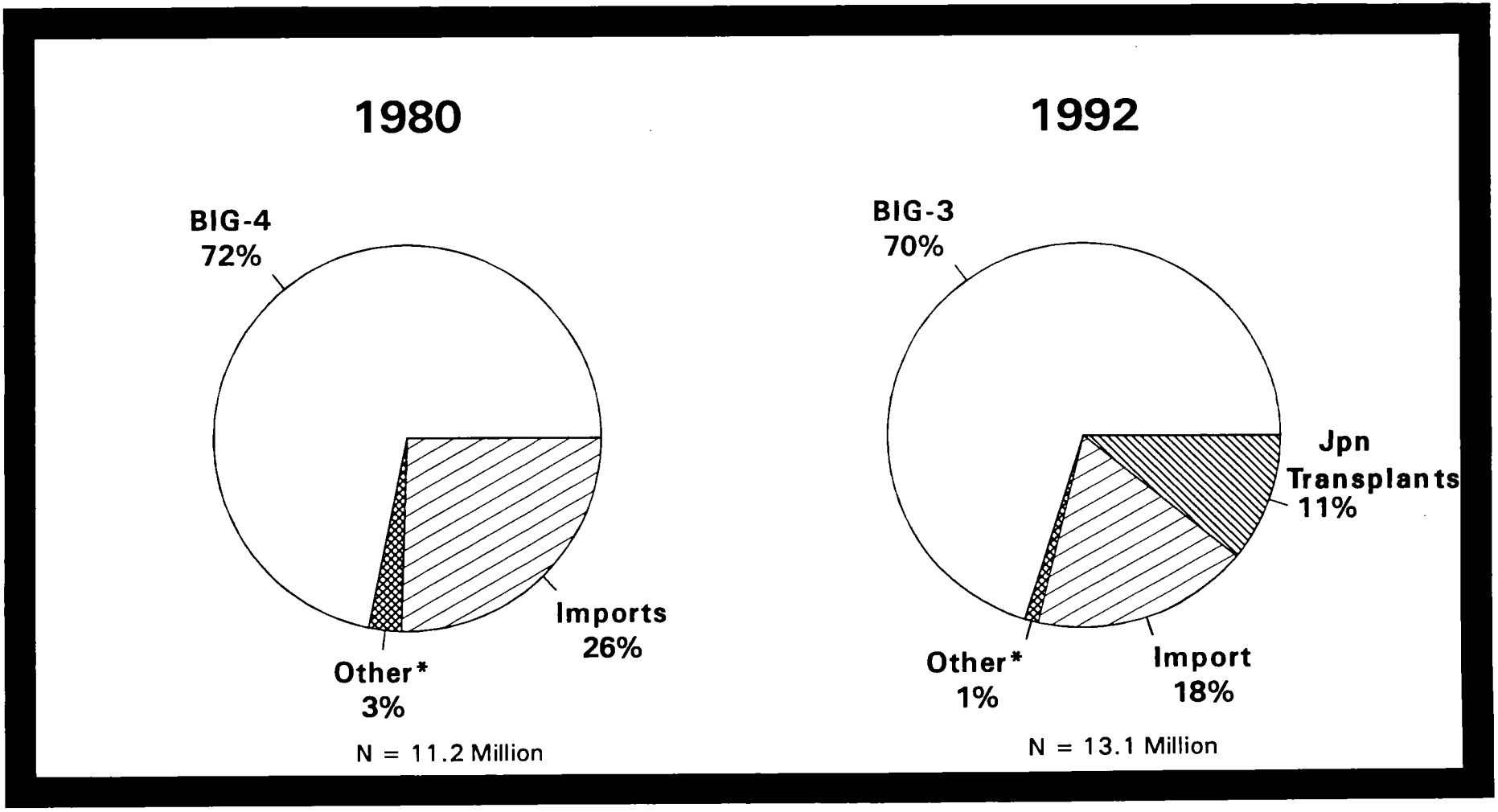
Japanese share of U.S. production increased because of the transplants



Source: Ward's Automotive Reports
Note: Production based on company nameplate

Total U.S. Sales (Including Trucks)

Big three percentage of U.S. sales decreased, even though total U.S. sales increased and total imports declined.



Source: Ward's Automotive Reports

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Total U.S. Light Vehicle Sales

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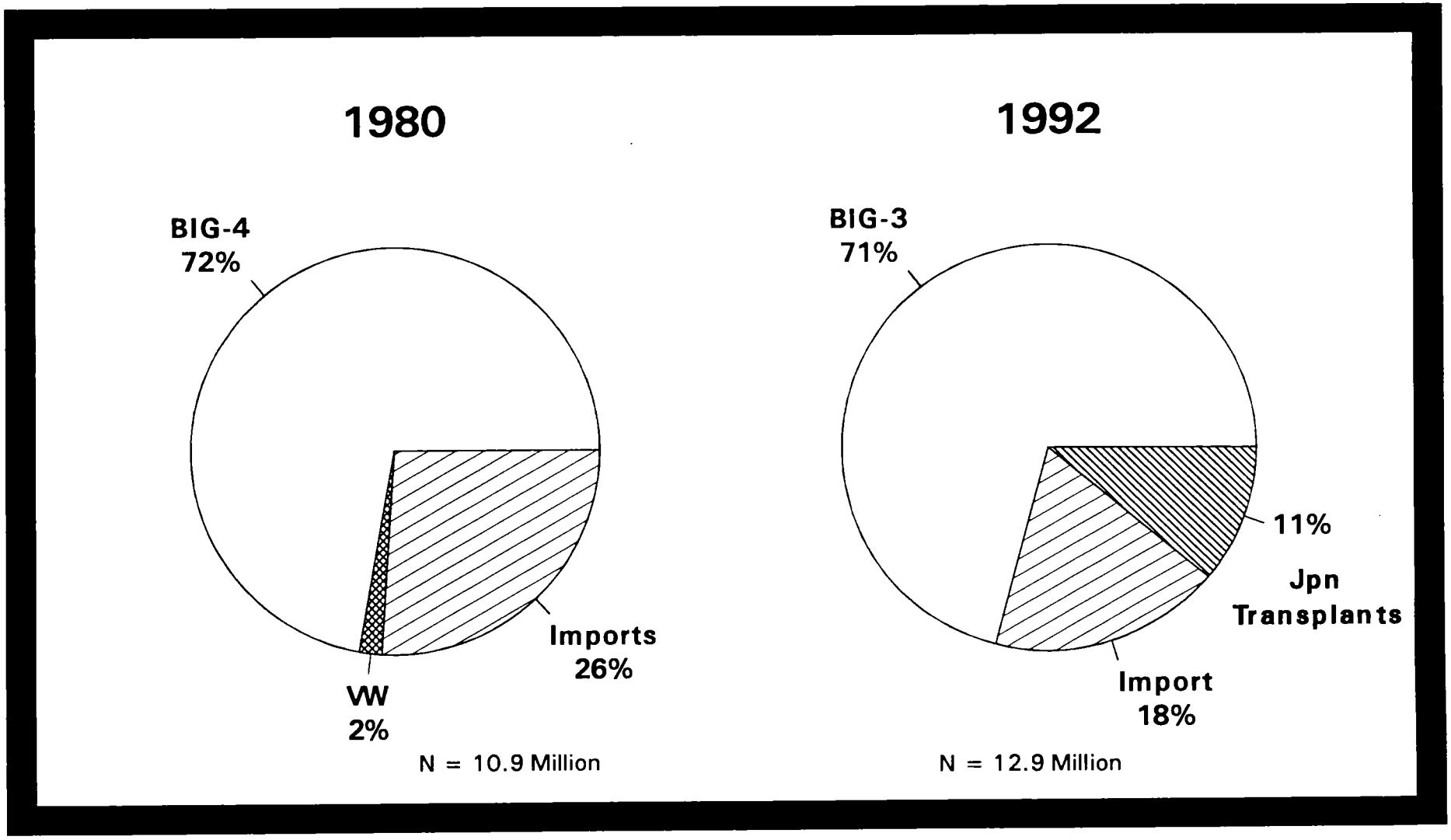
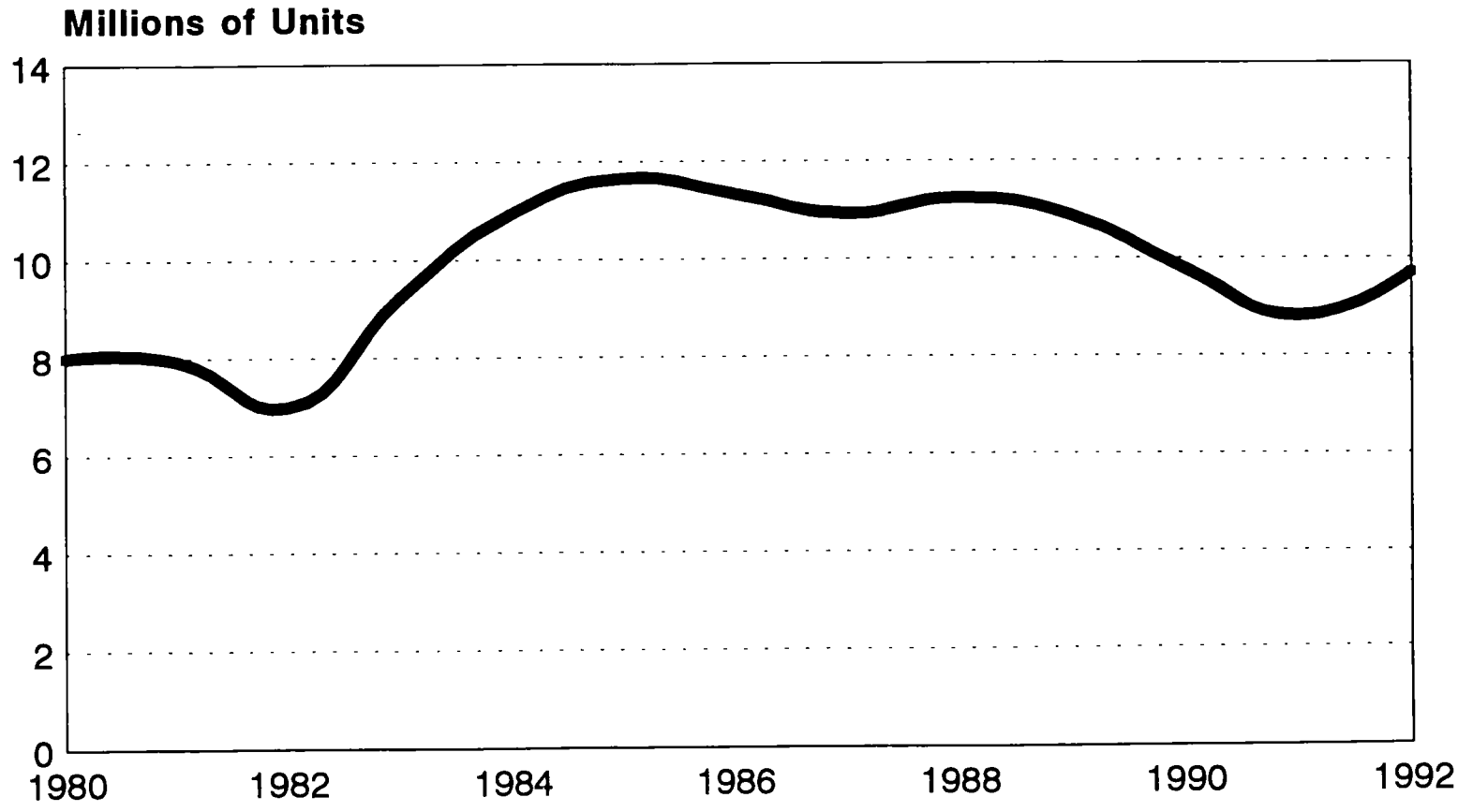


Source: Ward's Automotive Reports
Note: Sales based on company nameplate

Big 4 Vehicle Production

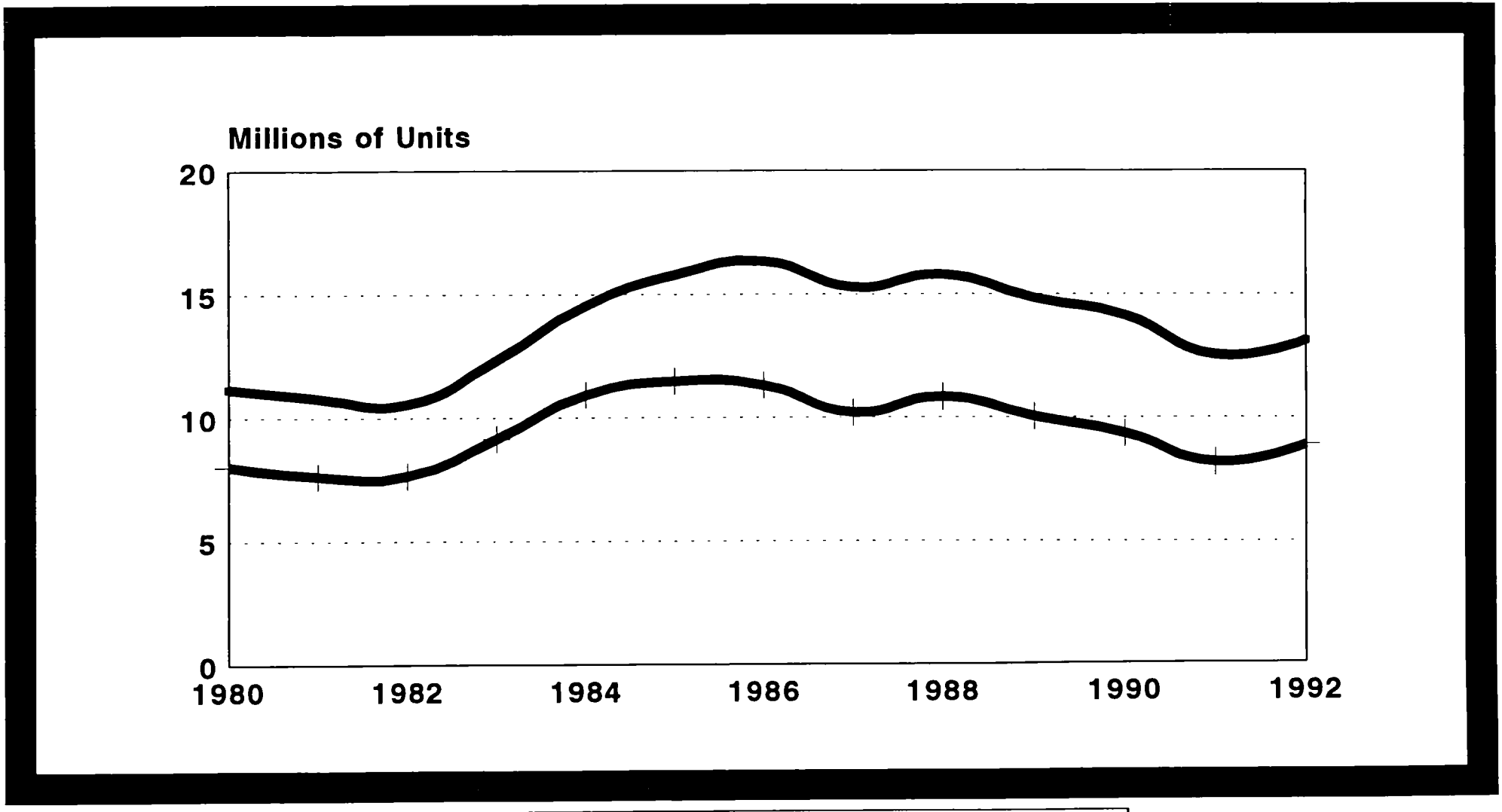
Vehicle production is cyclical



AMC from 1980-1986 only
Source: Ward's Automotive Yearbook (1992)

U.S. Motor Vehicle Sales

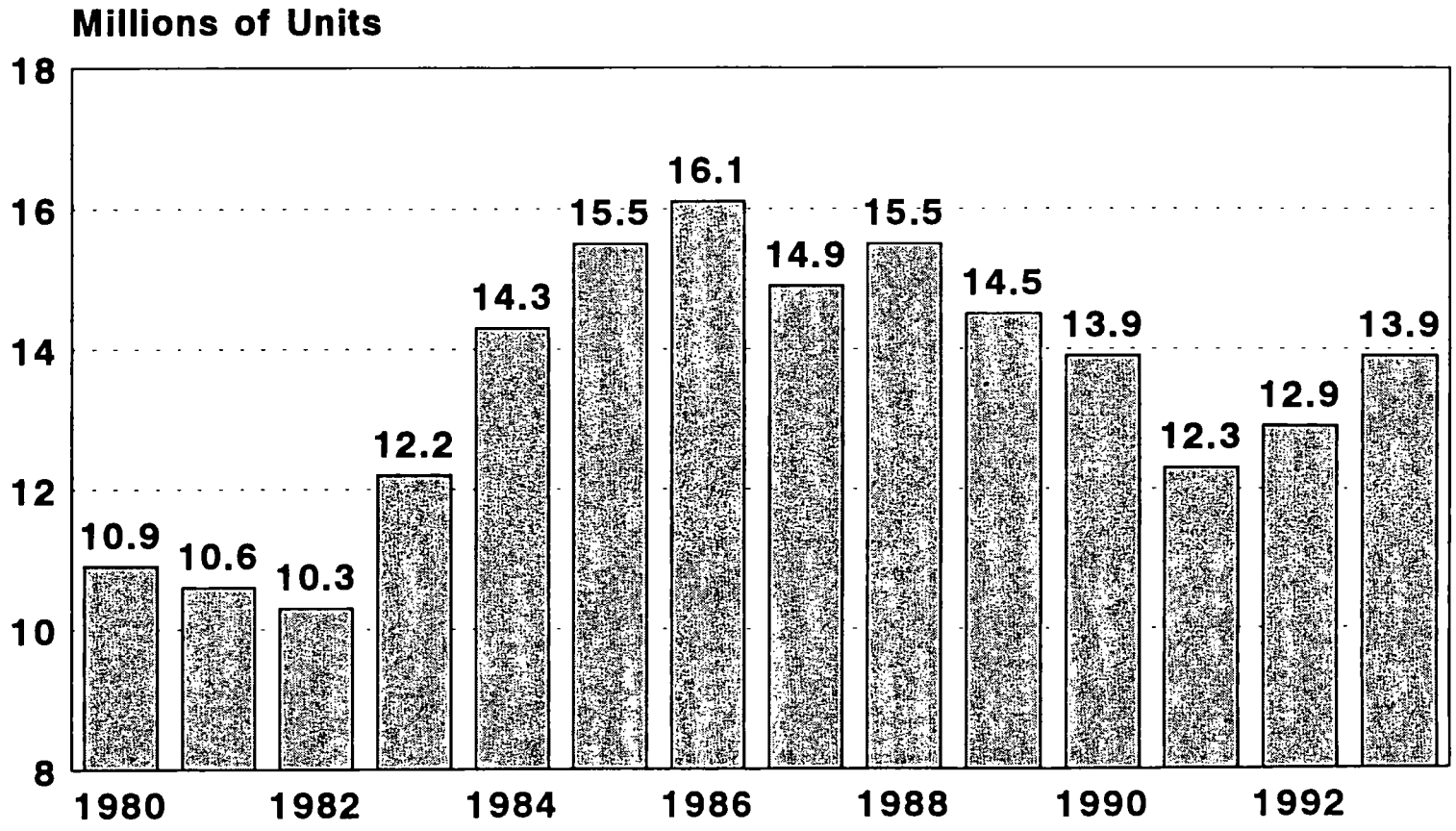
Total vehicle sales are also cyclical



Sources: Ward's Automotive Yearbook and Ward's Weekly

U.S. Light Vehicle Sales

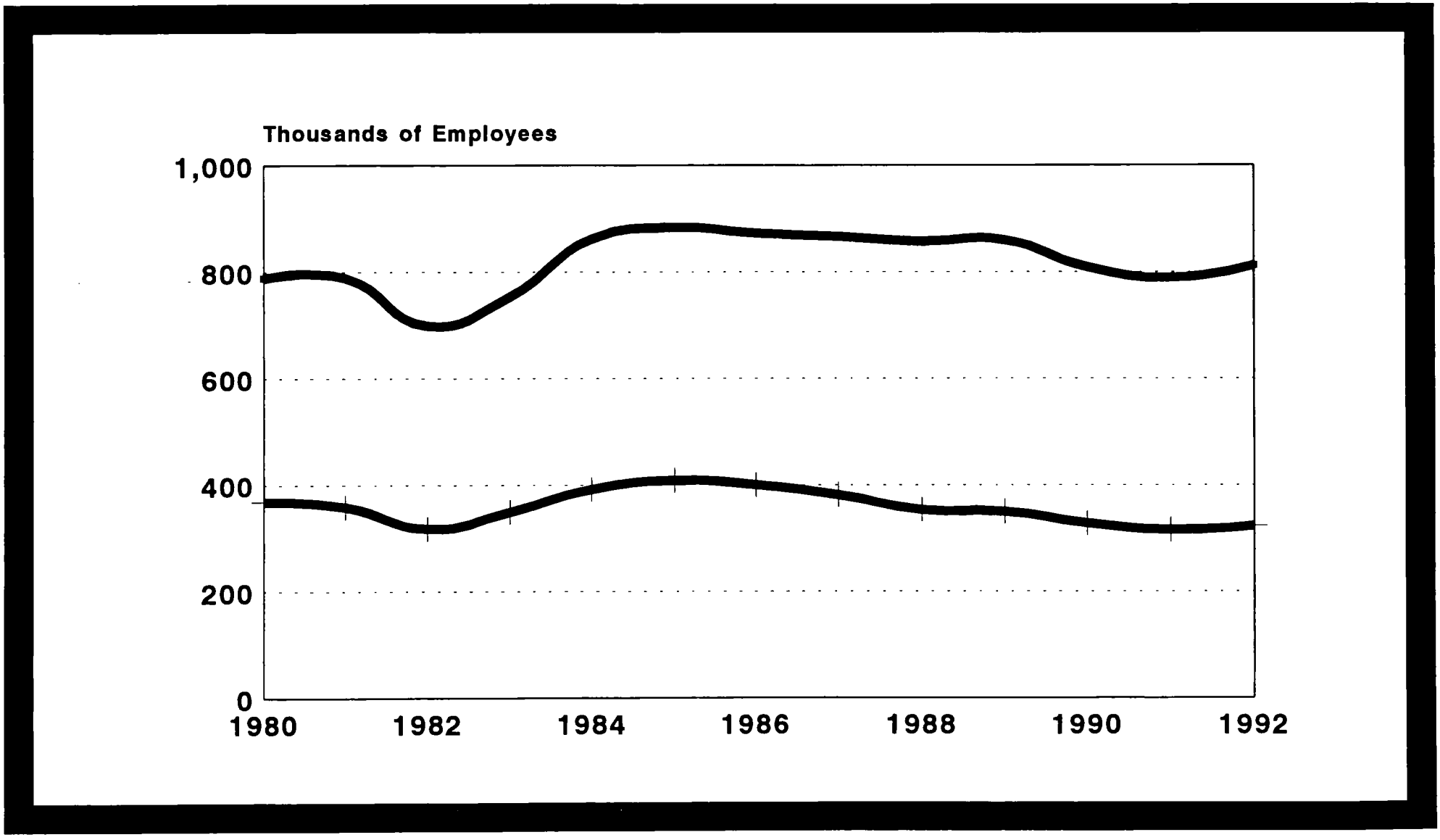
Light vehicle sales are also cyclical



1993 figure is a forecast
Source: Ward's Automotive Yearbook

Total Employment

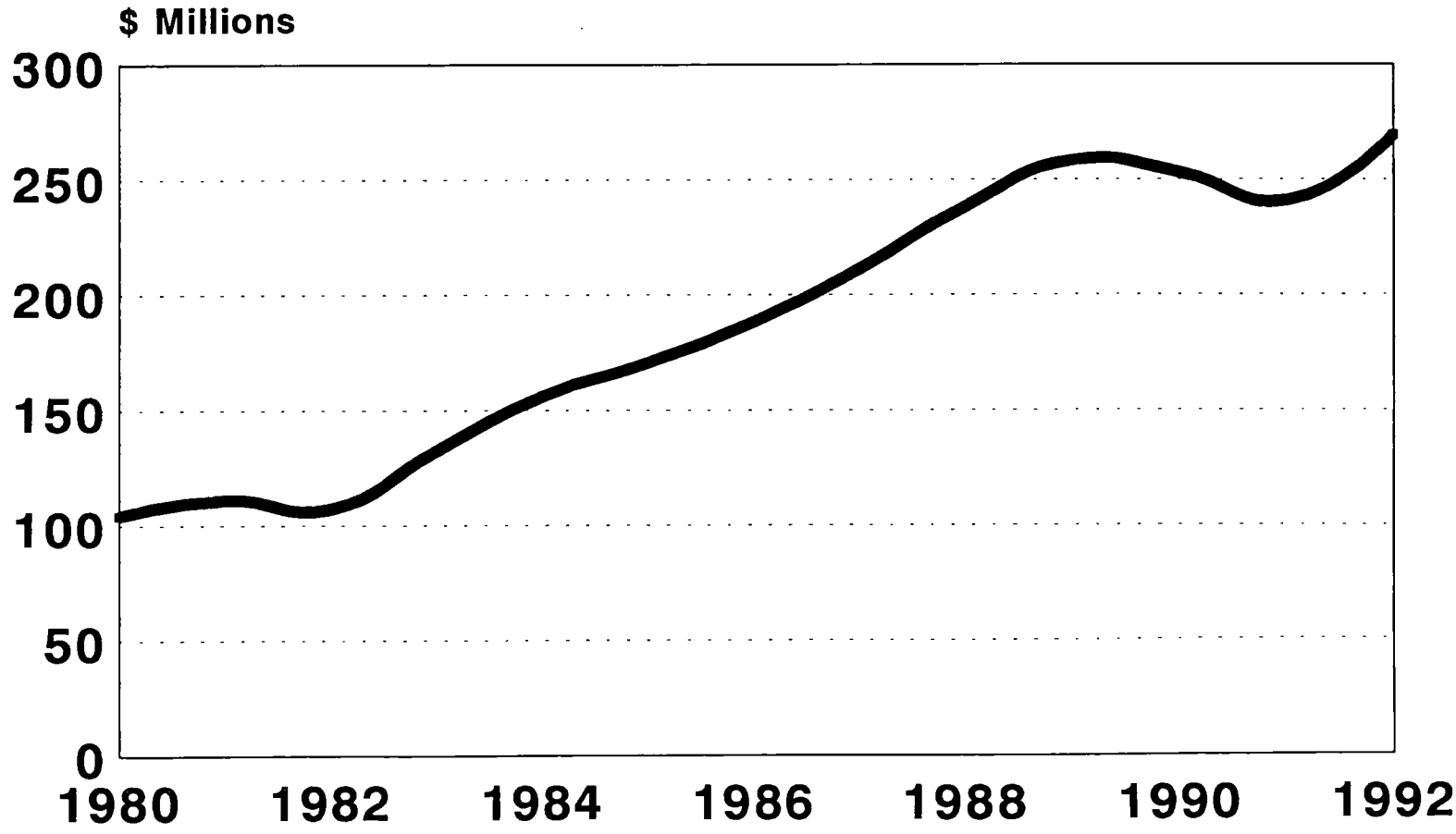
Industry employment levels have declined every year since 1985; employment was 230,000 less in 1991 than in 1978, the industry's peak employment year



Source: Bureau of Labor Statistics

Total Big Three Revenue

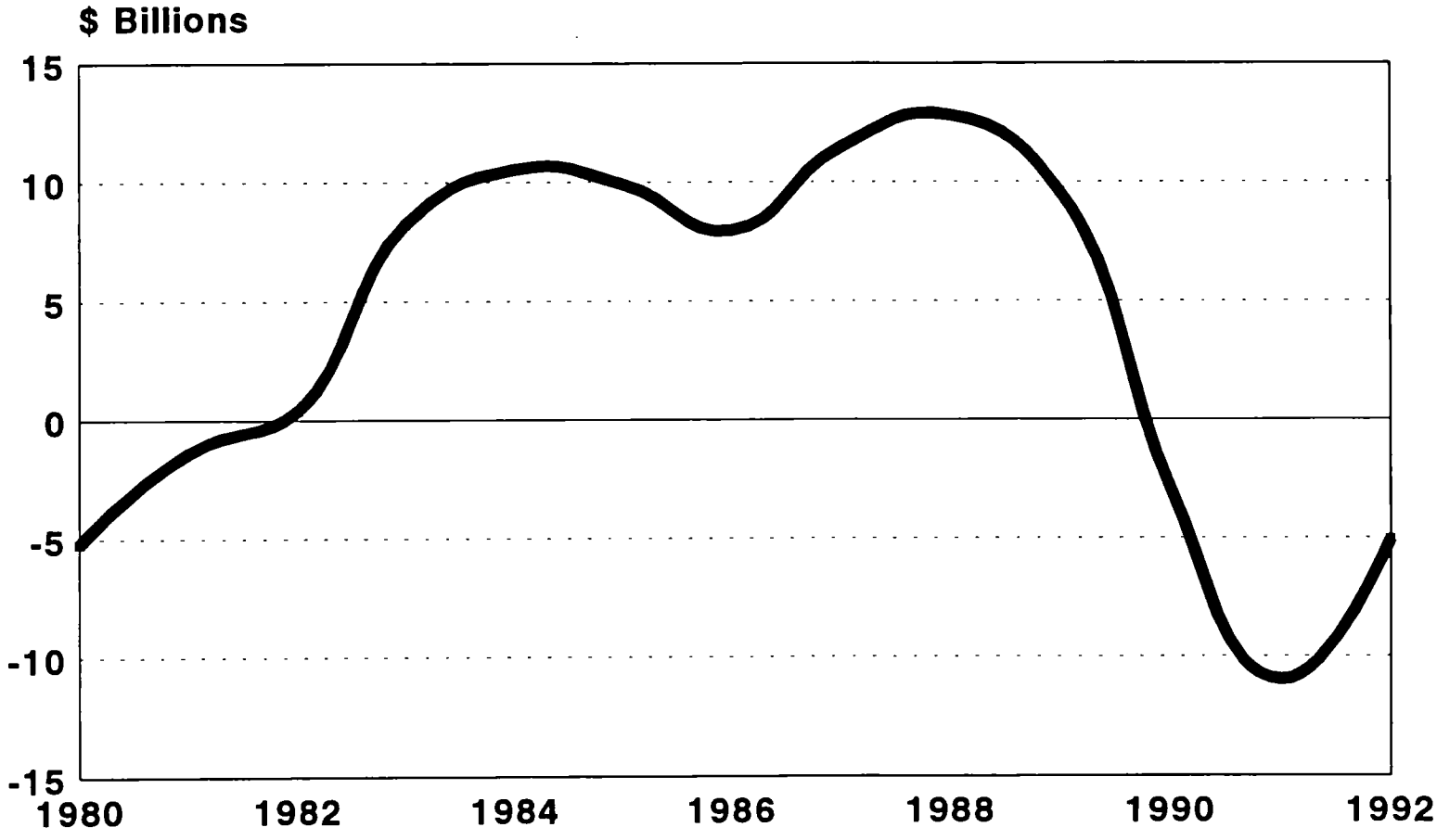
Revenues began to recover in 1992



Source: Ward's Automotive Annual

Big 3 Operating Income

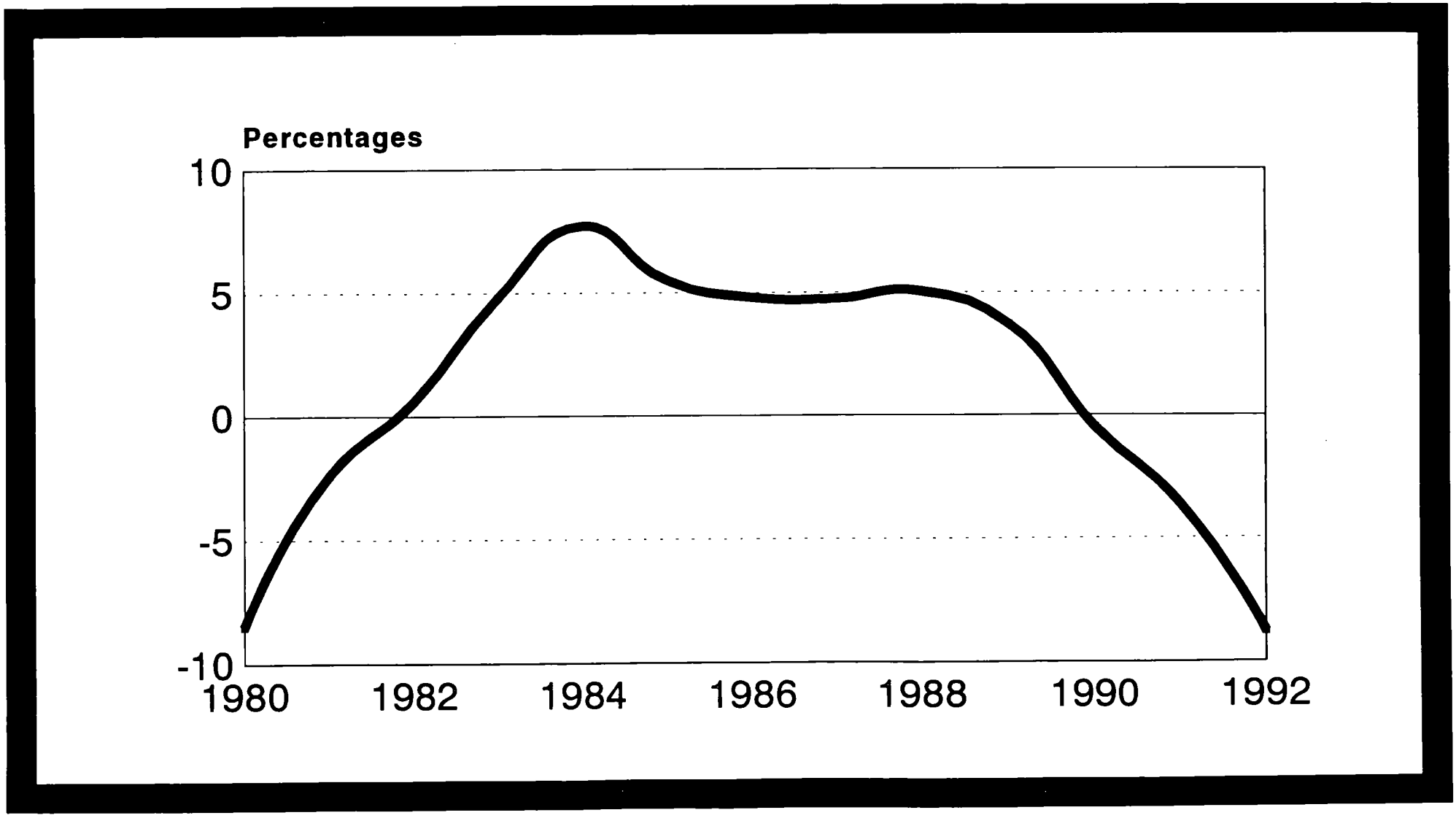
Operating income also began to recover



Source: Big Three Annual Reports

Big 3 Profit Ratios Are Still Declining

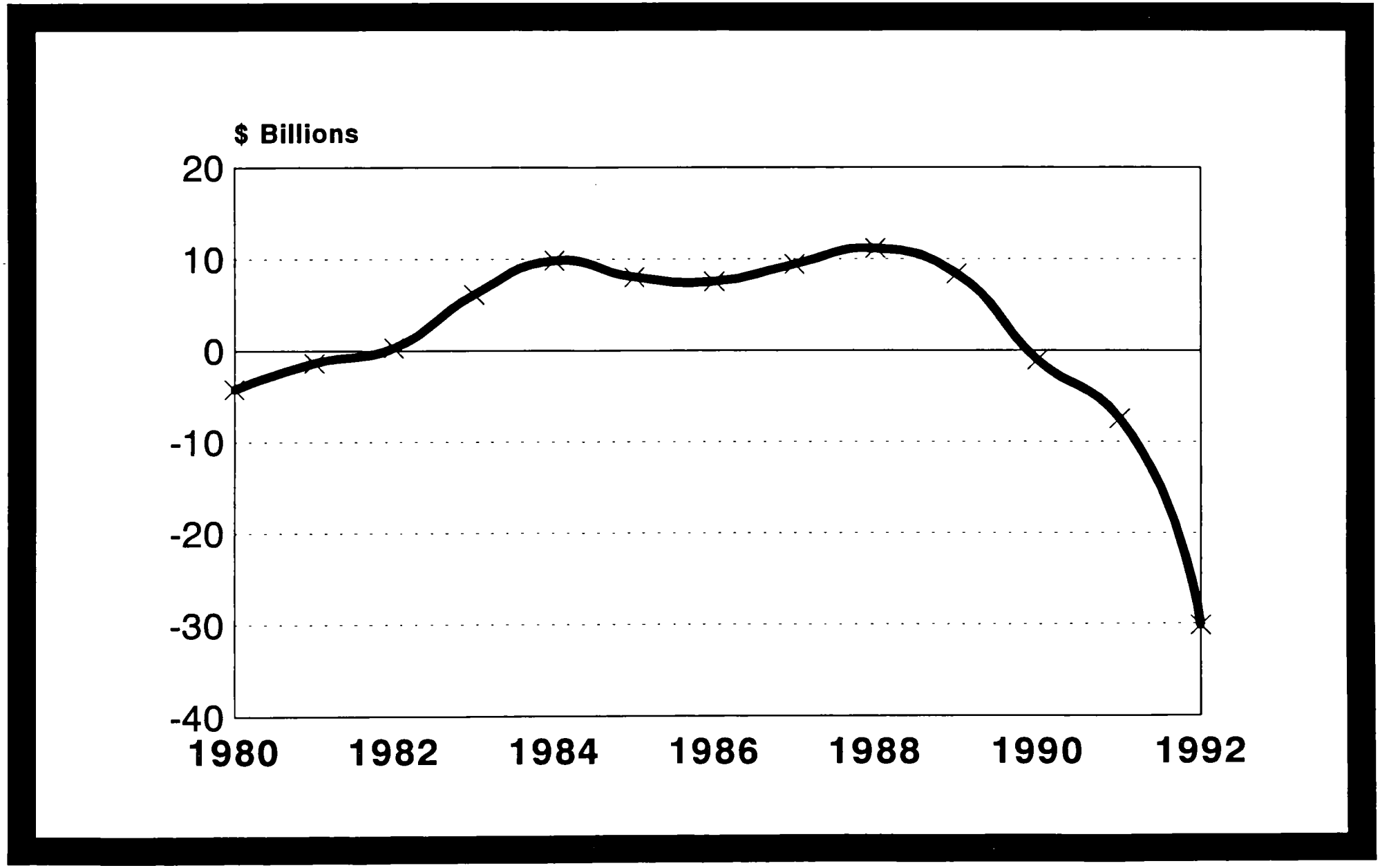
Return on Sales: biggest part of recent decline due to changes in accounting procedures



Source: Big 3 Annual Reports

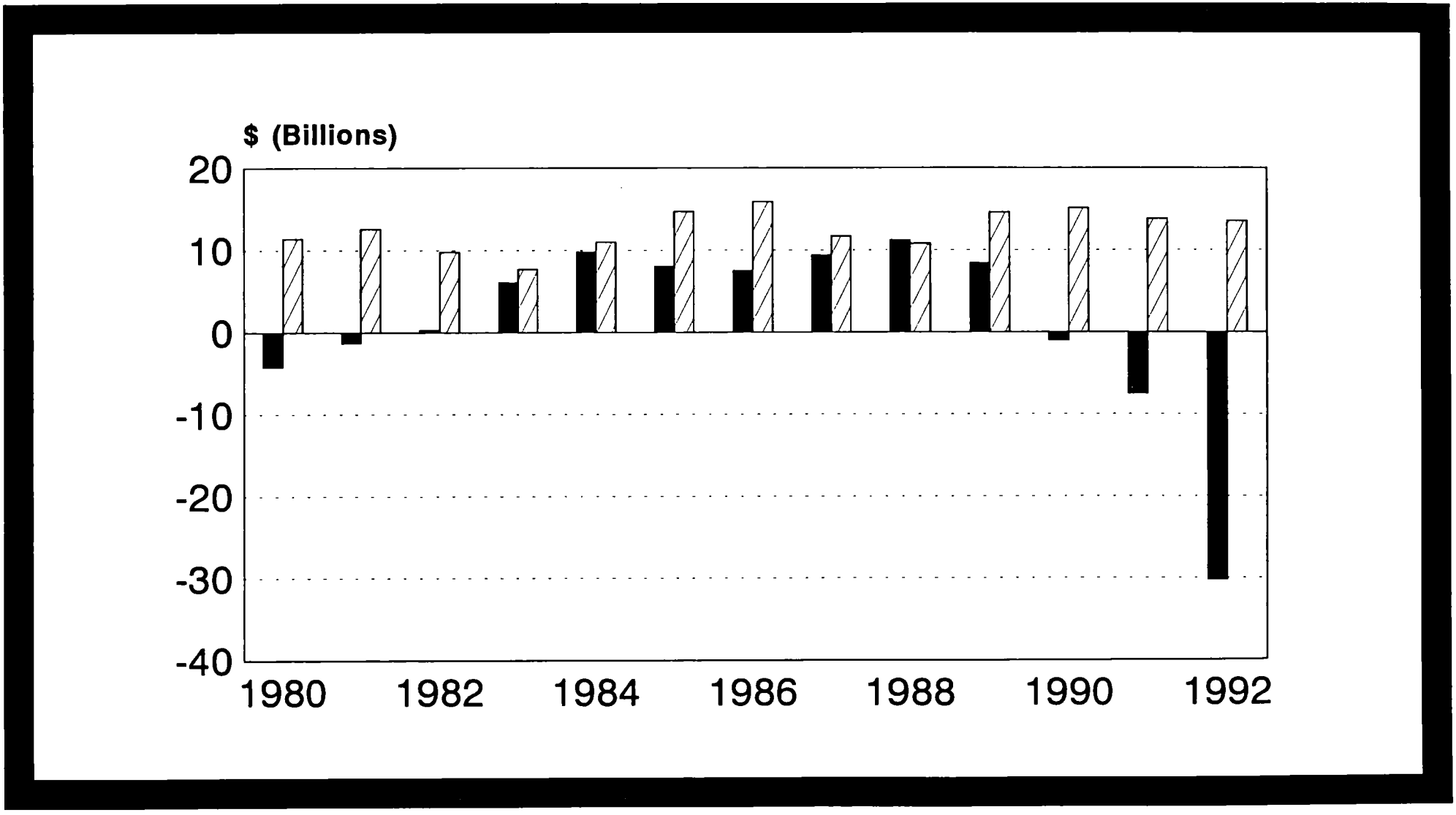
Big 4 Net Income

Changes in accounting rules sharply reduced 1992 net income



Source: Ward's Automotive Annual

Since 1988, the Big 3 have spent five times more than they have earned



Source: Company Annual Reports

U.S. Auto Parts Manufacturers

U.S. auto parts producers consist of three main types

U.S. Big Three Auto Parts Divisions

(14 companies)

U.S. Independent Auto Parts Manufacturers

(3,000 companies)

U.S. Subsidiaries of Foreign Auto Parts Manufacturers (475 companies)

Economic Importance of the Industry

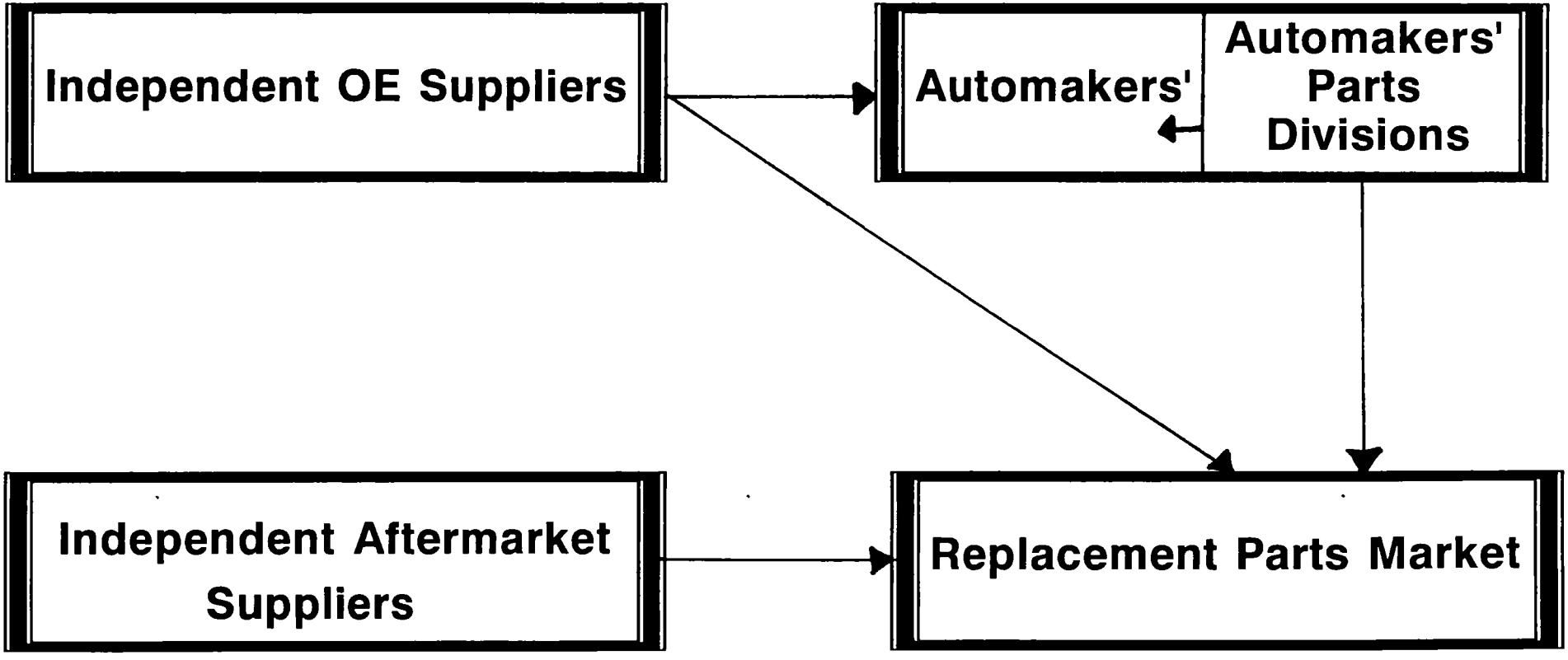
The U.S. automotive parts industry plays a vital role in the U.S. economy

- Parts production represents 2% of national GDP
- Parts manufacturing directly accounts for 3.2% of total manufacturing employment
- Every $1.00 spent on auto parts generates almost $2.50 in additional expenditures and income

Source: U.S. Department of Commerce

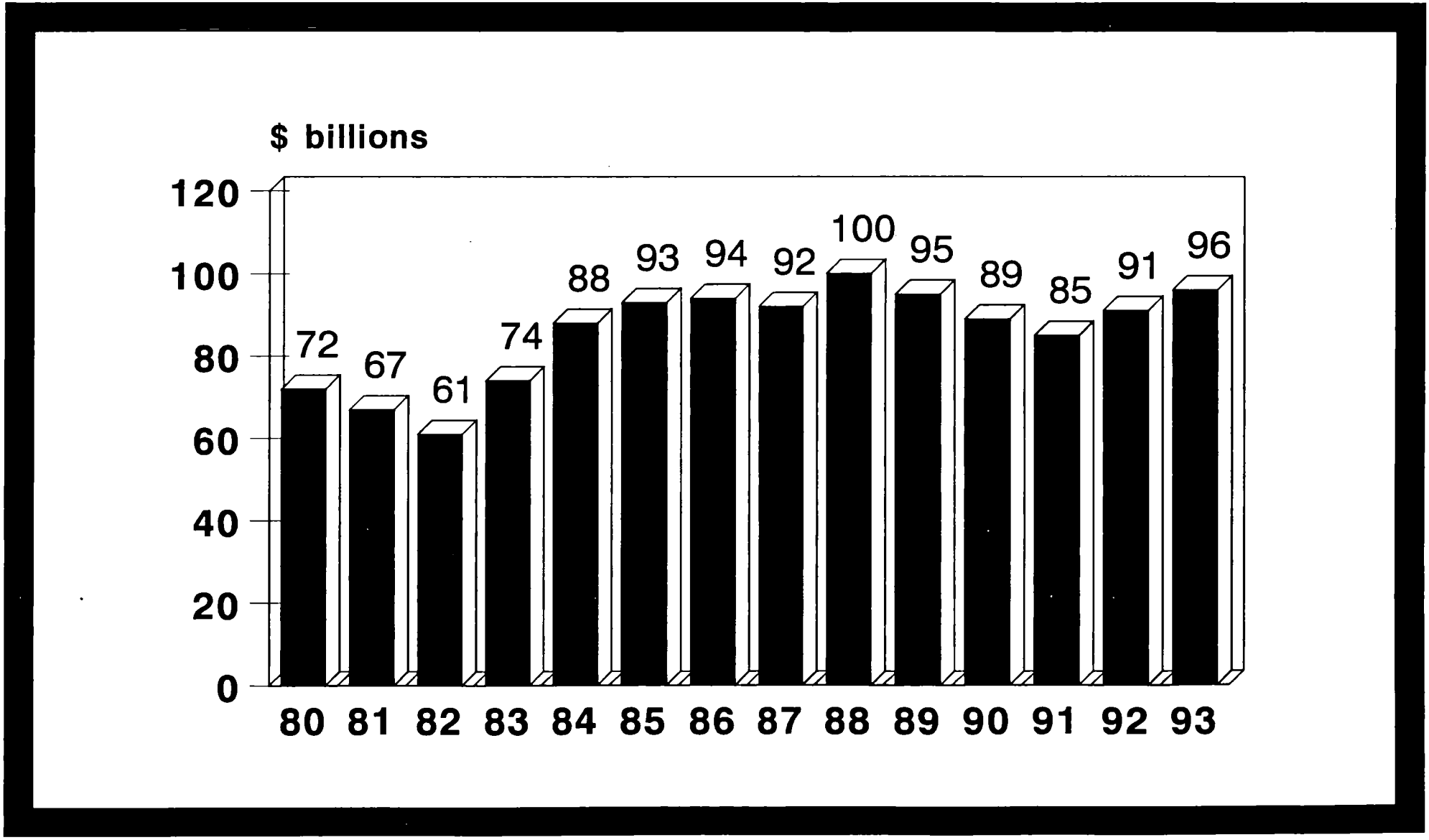
ndustry Relationships

U.S. parts manufacturers sell to automakers and the replacement parts market



U.S. Auto Parts Production

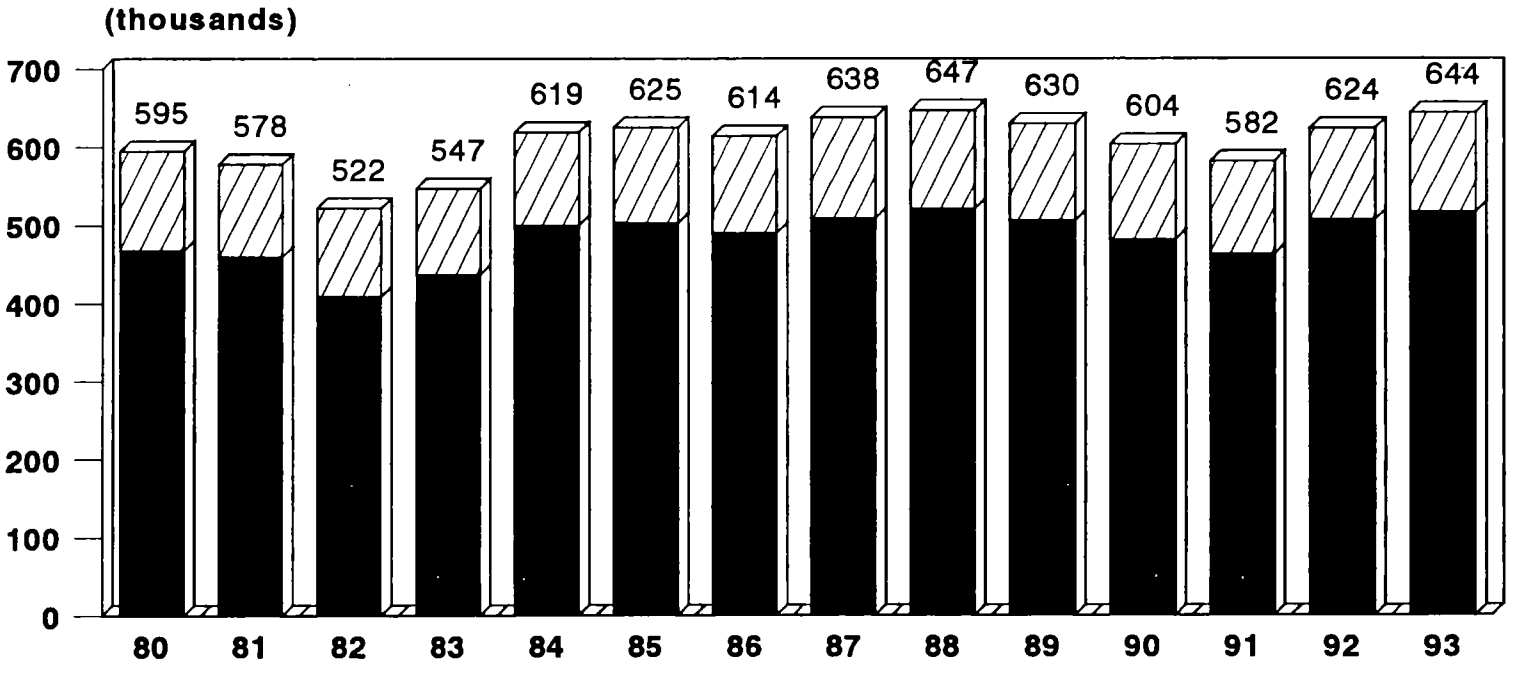
1992 marked the beginning of a cyclical upturn in output



In real (1987) dollars, post-1990 data are estimates
Source: U.S. Department of Commerce

U.S. Auto Parts Employment

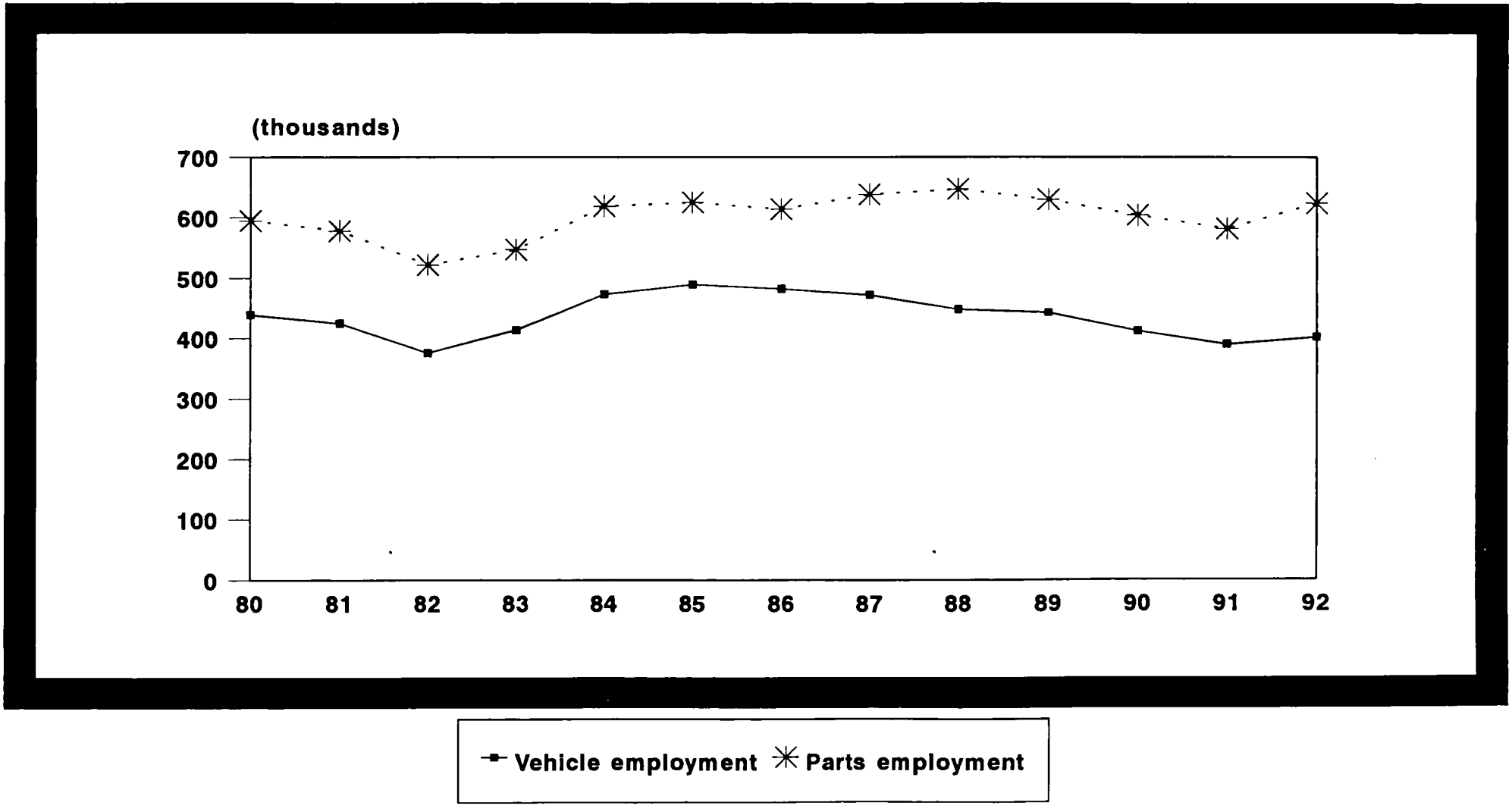
Employment cycles tend to track those of production



Post-1991 data are estimates
Source: U.S. Department of Commerce

U.S. Automotive Employment

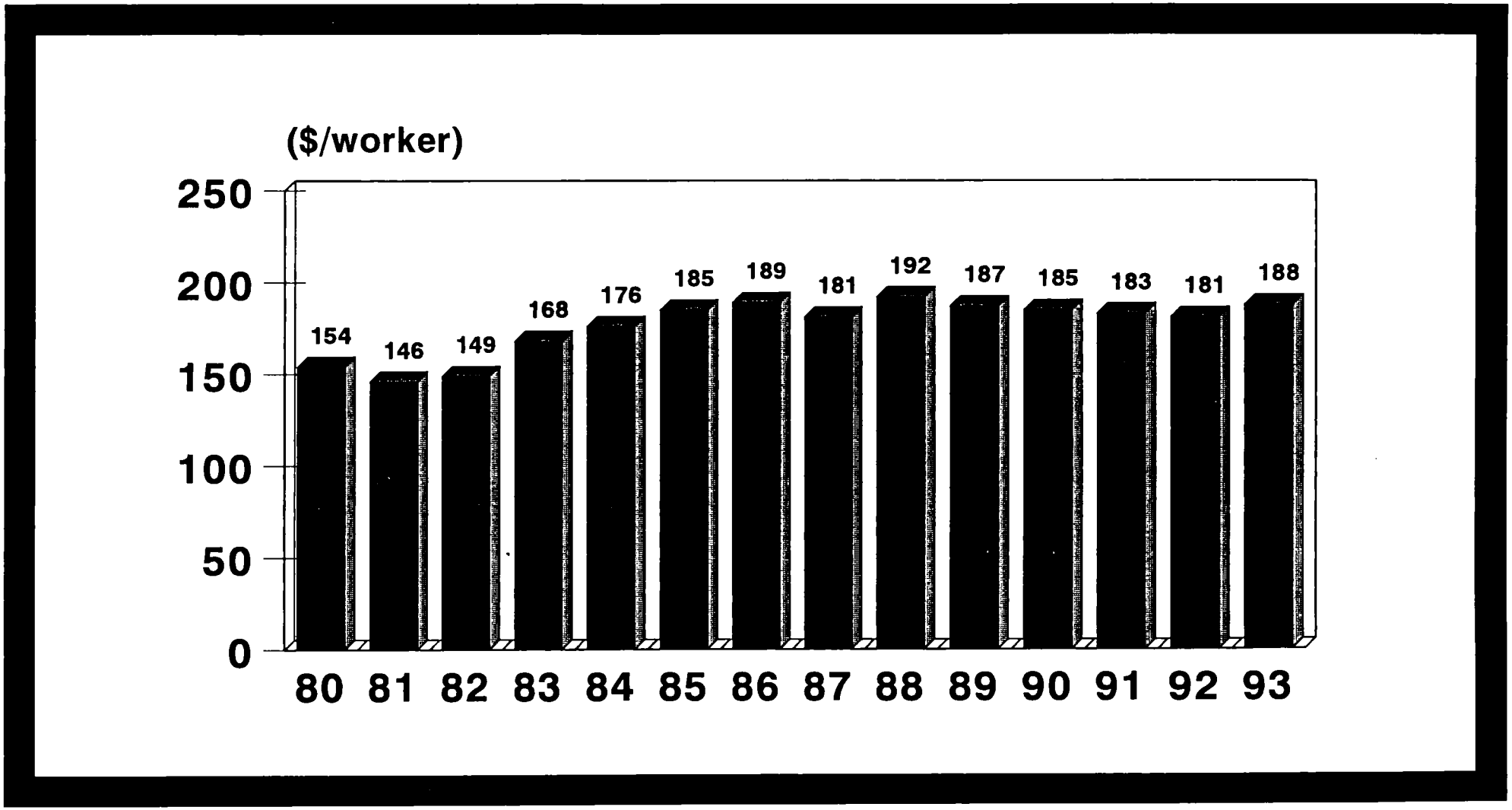
Employment in the parts and vehicles sectors tends to track each other



1991 and 1992 data are estimates
Source: U.S. Department of Commerce

Parts Industry Worker Productivity

Through the late '80s, worker productivity flattened



Post-1990 data are estimates
Source: U.S. Department of Commerce

ssues in the 80s

The 1980s was a decade of adjustment for the parts industry, characterized by three main issues

- Restructuring
- Increasing foreign competition
- Major changes in U.S. suppliers' manufacturing and design capabilities

Restructuring

The 1980s was a period of increased competition and consolidation for the U.S. parts industry

Japanese companies dramatically increased their presence in the U.S. market

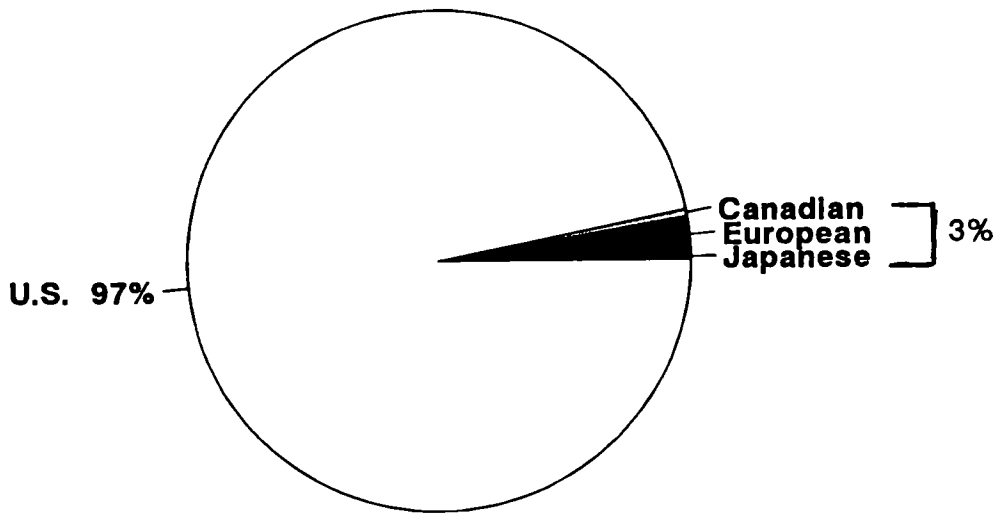
- U.S. auto parts companies experienced increased cost and quality pressures

U.S. companies were required to enhance their manufacturing capabilities

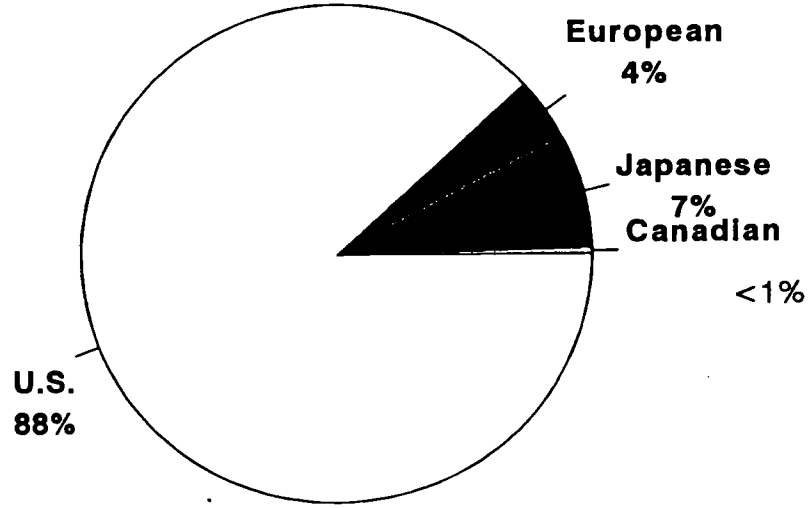
- Marginal U.S. auto parts firms exited the industry

ncreased Foreign Competition

The restructuring of the parts industry was prompted by an influx of foreign competition



1980
Total parts plants = 3,800



1992
Total parts plants = 4,000

Source: U.S. Department of Commerce

ncreased Foreign Competition

Foreign competition increased pressure on the domestic parts industry

- Increased Japanese presence in the U.S. market resulted in:
  - New state-of-the-art facilities
  - New technology being applied to parts production
  - Taking of traditional customers from U.S. companies
- Cost pressures also intensified because:
  - U.S. firms had higher costs than Japanese counterparts
  - U.S. product quality was sometimes lower
  - Automakers demanded lower costs and higher quality

Parts ndustry nvestment in Japan

Inequality of opportunity has hindered U.S. suppliers in the Japanese market

Compared to U.S. investment in Japanese market
- Fewer than 20 wholly owned U.S. plants in Japan
- Handful of JVs and licensees

Initial successes with Japanese are too small in volume to justify the huge capital investment required
- Sunk costs rarely recovered
- Profit not realized until years after start–up
- Not immediately involved in product development

JVs are often only way to begin business with Japanese
- Japanese usually control JV

Changes in Manufacturing Abilities

U.S. parts manufacturers made major changes to manufacturing and design capabilites in the '80s

- U.S. companies:
  - Adopted computer-aided design and manufacturing (CAD-CAM)
  - Adopted just-in-time (JIT) production and delivery capabilites
  - Are expected to perform and finance R&D

U.S. Parts Issues for the 90s

The '90s will see continuation of several current issues, as well as new opportunities

- Continued restructuring
- U.S.-Japan trade issues
- Increased opportunities in North America
  - German automakers
  - NAFTA

Continued Industry Restructuring

The restructuring of the U.S. auto parts industry focused on sourcing strategies, costs and quality

Companies have begun to rationalize their sourcing
- Ford has halved supplier base from 1980 to 1993 (1,450)
- Chrysler's suppliers cut from 3,000 in '90 to 2,500 in '92
- GM re-evaluating current suppliers

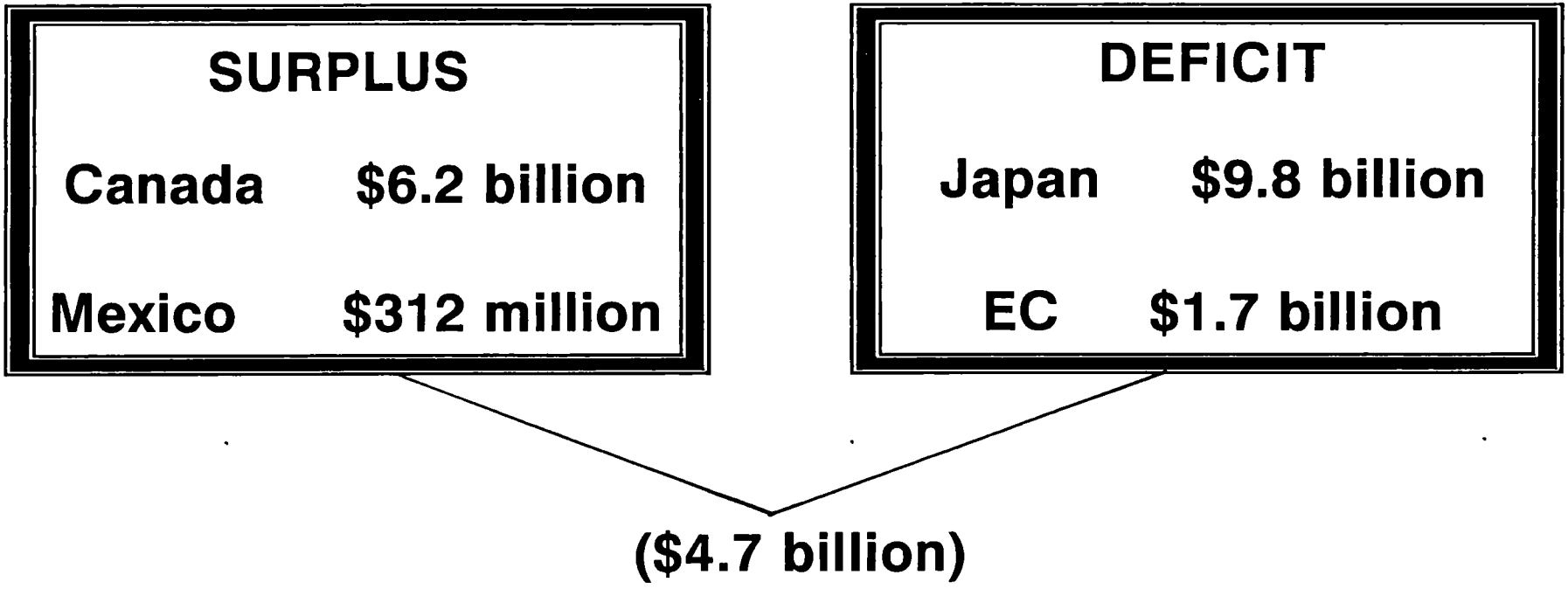
Cost reductions are continuing
- Ford asking parts suppliers for 1% annual cost cuts through 1997
- Chrysler has saved $150 million sine 1990
- GM aiming to save $3 billion in U.S. parts purchases

- Quality improvement
  - Big Three working closely with suppliers to improve parts quality
- Aftermarket firms reorganizing business operations to improve competitiveness
- All suppliers expected to perform and finance R&D

U.S. Auto Parts Trade

Since the early '80s, trade has become a more dynamic part of the industry

- In 1992, the U.S. auto parts trade deficit totaled $4.7 billion



Source: U.S. Department of Commerce

Increased German Presence

German automakers' plans to produce in the U.S. market will add a new competitive dimension

- German automakers plants in the United States should provide increased opportunities for U.S. suppliers
- U.S. industry should act quickly
  - Intense competition expected from European suppliers relocating to the U.S. and U.S.-based Japanese suppliers
- BMW plant in South Carolina to begin production in 1995
  - Initial sourcing from Germany and 28 current U.S.-based suppliers
  - Planning 50% domestic content by decade's end
  - Already purchasing $250 million in U.S. parts annually
- Mercedes to build plant in the southeast U.S. (probably North Carolina)
  - Spent $212 million on U.S. parts in 1990

NAFTA

The NAFTA agreement should benefit U.S. parts producers

- Will allow U.S. suppliers to rationalize North American operations
- Benefits to U.S. suppliers include:
  - 10-year phase-out of Mexican parts tariffs
  - Increased levels of North American content
  - Elimination of Mexican value-added requirement
  - U.S. firms can invest freely in Mexico
  - U.S. firms can take over their joint ventures

Industry Outlook

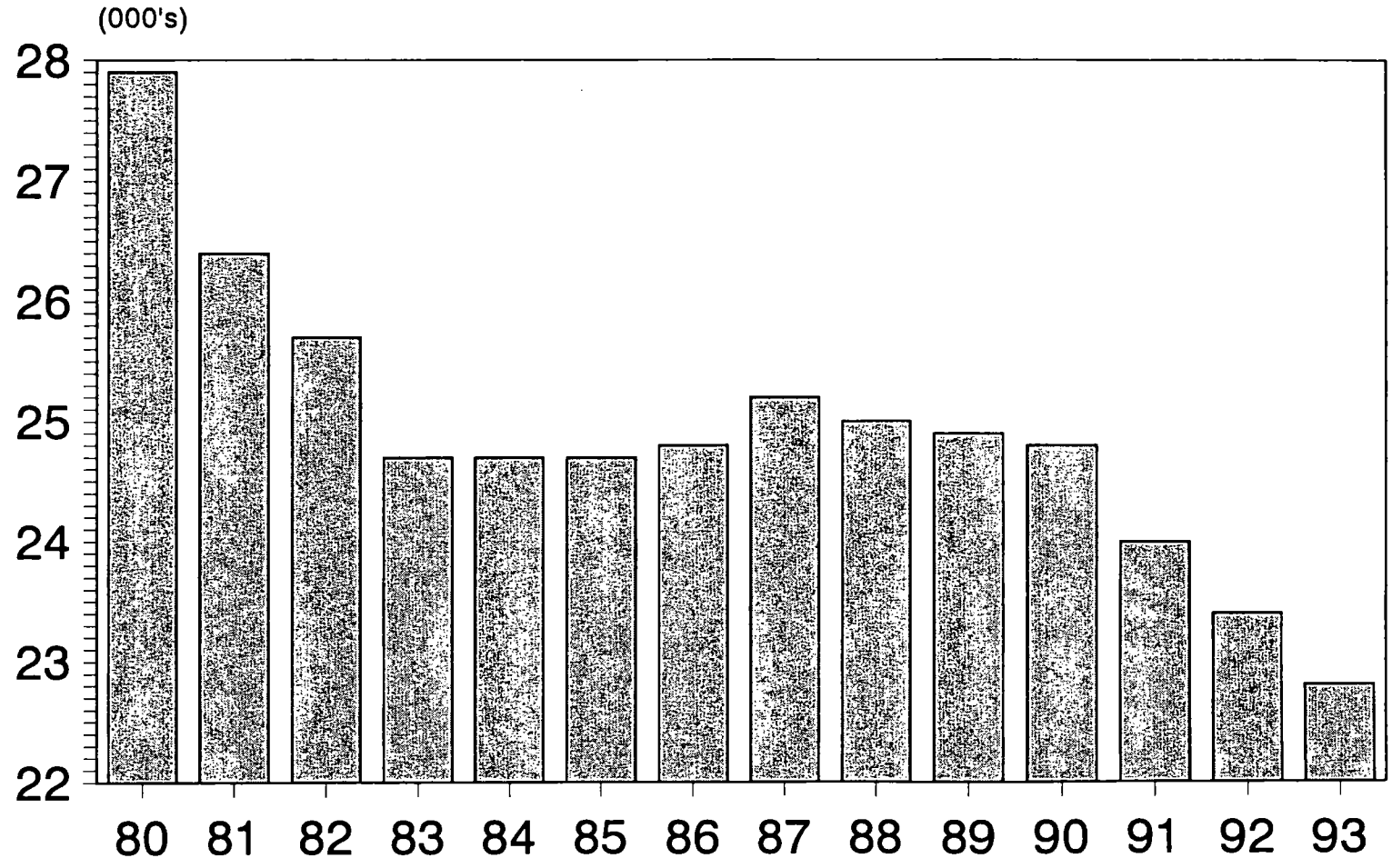
1993 will see a continuation of the cyclical upturn

- Production will rise 6% to $96.3 billion in 1993
  - Bolstered by increase in vehicle output
  - Improvement in overall economy will prompt increase in repairs and maintenance
- Employment will grow 3% to 644,000 in 1993

Source: U.S. Department of Commerce

U.S. New-Car Dealerships

The number of new car dealerships has declined since the 1950's



Source: National Automobile Dealers Assn

The Number of New Car Dealerships Has Declined

Primary causes include

- Economic downturns place strain on small, over-leveraged dealers
  - 1986 (industry's highest sales year): net profit before taxes was 2.2 percent
  - 1991 (mid-recession): net profit before taxes was 1.0 percent

- Big-3 have on-going consolidation program. Have eliminated low volume, rural dealerships. By 1992,
  - 21,675 dealerships represented foreign brands
  - 18,044 dealerships represented Big-3 brands

- Single-brand dealerships for several European brands have closed with the decline of the manufacturers they represented
  - Alfa Romeo
  - SAAB
  - Porsche
  - Rover
  - Volkswagen/Audi
  - Renault
  - Peugeot
  - Fiat

Effects

Consolidation has had benefits for some dealers
- 1981: 26,350 dealers averaged 400 sales each, totaling $5.5 million
- 1991: 23,400 dealers averaged 526 sales each, totaling $12.9 million

Source: National Automobile Dealers Assn.

ssues for the 1990's

The 1990's will present the auto industry with many challenges:

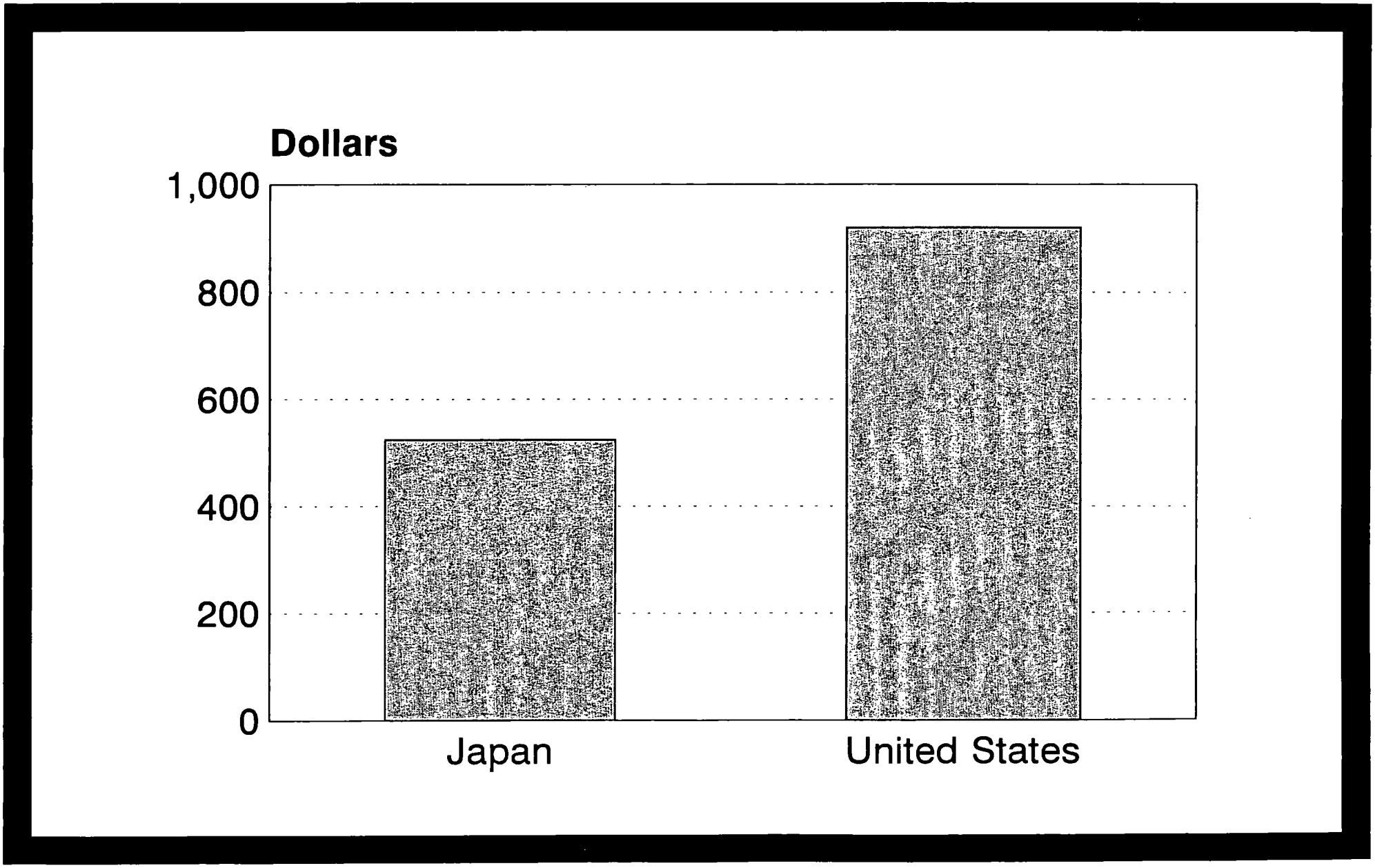
- Health care costs are a huge burden
- Increasing environmental quality standards must be met
- Technological improvements are needed
- Safety standards are becoming more rigorous
- Worker adjustment assistance is necessary
- Some overseas markets remain restricted
- The nature of competition is changing

Health Care Costs

- Containing health care costs is becoming increasingly important to industry competitiveness
  - In 1992, U.S. per capita health care costs were $2,600 vs. $1,200 in Japan
  - An aging worker population is contributing to under-funded pension liabilities (GM: $11.8 billion, Chrysler: $4.0 billion as of 1992)
  - This results in exponential growth in costs
    - Ford now spends more on health care than steel for its vehicles ($1.4 billion on health care; $1.1 billion on steel in 1992)
- Pension costs are increasing
  - There are approximately 4 Big Three retirees for every 5 active employees
  - Required changes in accounting procedures for retirement benefits resulted in record one-time charges of $20.8 billion and $7.5 billion to GM and Ford, respectively, in 1992

Per Vehicle Health Care Costs

Per vehicle, U.S. health care costs are about $500 more than Japan's



Source: Economic Strategy Institute

Environmental Quality Standards

- Stationary Source Emissions (Manufacturing Plants)
  - air, water, noise, and solid waste regulations
  - environmental impact statement and application process will slow down approval for new facilities

- Mobile Source Emissions (Vehicles)
  - corporate average fuel economy requirements
  - gas guzzler tax
  - tailpipe emission controls
  - on-board emission diagnostic systems
  - CFC ("freon") phase-out
  - noise emission standards

Upcoming Environmental Regulatory Concerns

- The 1990 Clean Air Act imposed 50 new regulations on auto producers
- Industry estimates that compliance will increase expenditures by $10 billion per year add $1200 to cost if a car or light truck by 1998 when all regulations are applicable
- Stationary (Manufacturing Plants)
  - 1990 Clean Air Act greatly reduces allowable volatile emissions from paint spraying operations; regulations now being drafted
  - By 1995 state governments will be required to issue operating permits for plants emitting air pollutants; states may collect permit fees based on emission outputs beginning 1994
- Mobile (Vehicles)
  - By 1994, on-board emission controls must function for 100,000 miles, compared with 50,000 miles previously
  - On-board refueling vapor recovery devices will be required on 1998-model year passenger cars
  - State of Texas has decreed that by 1998, 90% of Texas state-owned vehicles must be powered by liquid natural gas
  - By 2002, 90% of all Texas local governments must comply
  - California has decreed that by 1998 model year, 2% of all new vehicles sold in California must emit no pollutants
  - By 2003, 10 percent must emit no pollutants

Technological Improvements

Technological improvements are the key to continued global competitiveness

Technological improvements can result in more cost effective ways of:

- Increasing Fuel Economy
- Insuring Passenger Safety
- Reducing Harmful Emissions
- Manufacturing More Quickly, Flexibly, and Efficiently; and
- Achieving the "Clean Car"

Current Federal Motor Vehicle Safety Standards

There are currently 70 regulations in effect concerning:

- Crash avoidance
  - Driver controls (location and identification)
  - Windshield washing and defogging
  - Light and reflector placement
- Post crash protection
  - Fuel system integrity
  - Flammability standards of interior materials
- Occupant protection
  - Steering wheel impact protection
  - Seat anchorage
  - Child restraint systems standards
  - Minimum side door strength requirements

Future Safety Regulations

Future safety requirements will place additional cost pressures on industry

Model Year	Regulation
1994	Install full car passive restraints
	Tighten car and truck side impact standards
	Increase truck roof crush standards
1995	Introduce truck passive restraints
	Require driver and passenger side airbags
1997-98 (Expected)	Strengthen vehicle roll-over protection bars
	Establish head injury protection standards
	Require heavy truck anti-lock brakes

Worker Adjustment

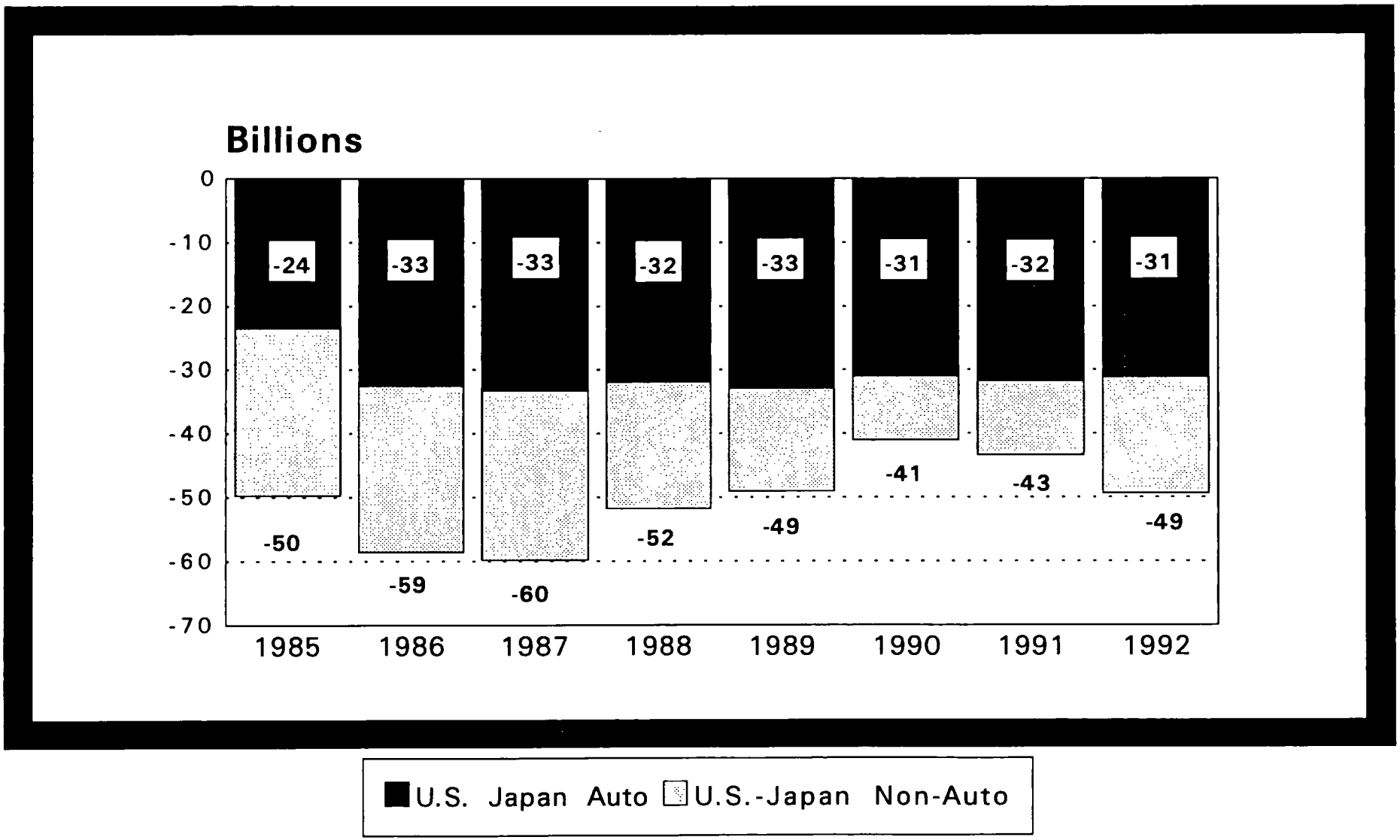
Worker retraining issues will continue throughout the 1990's

- Automotive jobs will continue to be lost as workforce is downsized to meet competitive pressures

- To date GM has announced that 74,000 blue and white collar jobs will be lost by 1995

Restrictive Overseas Markets

The U.S.-Japan automotive trade deficit remains a high percentage of the overall merchandise trade deficit.



Source: U.S. Department of Commerce

Changing Nature of Competition

Assuming Cost and Quality Parity is Reached, Continued Competition will Occur in the Areas of:

- **Lead Time - to allow customization and adoption of late stage technology**
- **Product Technology - to allow for the inclusion of value-added features**
- **Design - because automobiles will continue to be part of a lifestyle statement for most consumers**
- **Selling/Service Experience - because vehicle purchase decisions will be based on overall ownership factors**

Conclusions

Vehicles Industry

- The U.S. vehicle industry is recovering from a cyclical downturn although worker dislocations will continue to be a problem
- The vehicle industry continues to face cost and technology pressures from environmental, safety, and competitive fronts
- Although currently profitable, it is not clear whether the industry can generate the investment capital needed to meet all these new challenges
- Greater cooperation is needed between industry, government, and academia to deal with the challenges of the 1990's

Conclusions

Parts Industry

- Through the 1980's, weak firms exited the industry while strong firms grew and expanded their technical capabilities
- U.S. parts firms are now an integral participant with car makers in the design and development of future vehicles produced in the U.S. and around the world
- The U.S. auto parts industry is now focused on continuous cost reductions and quality improvement to improve its competitiveness worldwide

Clinton/Gore Clean Car' Initiative

- Establish a task force for linking Federal research efforts with those of the auto industry.
- Create an advisory group of Federal and state officials to address regulatory and procurement issues that would encourage new prototypes
- Prepare a list of capabilities in national labs and defense facilities that could be rapidly integrated into research teams

OSTP Strategy

Implementation of President's Clean Car Program

- DoC takes lead role in interfacing with auto industry
- Use FCCSET Advanced Manufacturing Technology Initiative for coordinating Federal Clean Car R&D efforts
- Presidential announcement of joint industry-government program by April 30th

FCCSET Clean Car Working Group

- Small Teams to:
  - Establish industry interfaces
  - Review industry needs and priorities
  - Develop taxonomy of technologies
  - Define joint program principles
  - Conduct inventory of on-going R&D
  - Establish design requirements
  - Create vision/mission statements
  - Draft program announcement